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ABSTRACT

This conference proceedings presents abstracts, complete papers, and author biographies for the 1994 Computer Assisted Language Instruction Consortium (CALICO) annual symposium on human factors in computer-assisted language learning (CALL), specifically the actual use of software by the human learner and teacher. Presented topics included courseware, preconference workshop reports, and conference papers presented, including guest speaker papers. Papers addressed human factors as well as human-computer interactions. The Preconference Workshops included sessions on CALT, digital video and interactive video, WinCALIS Author 2.0, and computer-adaptive testing. The Courseware Fair included presentations on various ongoing CALL projects and programs. Presentations ranged from practical classroom applications to future research suggestions, including discussion of the information superhighway and computerized speech applications. (Contains numerous references.) (NAV)

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ED 386 944

CALICO '94
ANNUAL SYMPOSIUM

MARCH 14-18, 1994
NORTHERN ARIZONA UNIVERSITY

PROCEEDINGS OF THE
COMPUTER ASSISTED LANGUAGE INSTRUCTION CONSORTIUM
1994 ANNUAL SYMPOSIUM
"HUMAN FACTORS"

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ANNUAL SYMPOSIUM

March 14-18, 1994
Northern Arizona University

Proceedings of the
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1994 Annual Symposium
"HUMAN FACTORS"

Edited by
Frank L. Borchardt, Duke University
Eleanor M. T. Johnson, CALICO

Layout, Design, and Typography by
Kerrie A. Hudzinski

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Thanks to the SIG Chairpersons, congratulations to the new Chairpersons, and congratulations to the newly elected Associate Chairpersons for 1994-1995: Robert Zerwekh (Artificial Intelligence); Marc Neil Siskin (Courseware Development); Otmar Foelsche (Foreign Character Fonts/Asian Languages); Jack Burston (Hypermedia); Robert Fischer (Interactive Audio/Video); and Carol Chapelle (Language Acquisition & Technology).

Proceedings of the Computer Assisted Language Instruction Consortium

1994 Annual Symposium on "Human Factors"

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INTRODUCTORY REMARKS

FRANK L. BORCHARDT

An annual symposium such as CALICO conducts every year — now for the eleventh consecutive year — serves a number of purposes. The leaders in the field get a chance to present their year's work to their colleagues from around the world. In some years, the advances are quite dramatic, such as those that introduced the graphical user interface, multimedia, or CD-ROM. In other years, the advances are incremental. What is clear is that the leaders are never standing still. There is always something new to witness. And there are always new people interested in finding out what they need to know about educational technologies and language learning. The Preconference Workshops, as they should, provide newcomers a choice of a general introduction and being brought up to date on multimedia, on testing, and on authoring environments for the chief platforms. The Courseware Fair gave the practitioners a chance to provide all comers some hands-on experience with what was happening in the field then and there. Those are, perhaps, the parameters of service which encompass an annual CALICO Symposium: Old-timers gathering annually to show and look; newcomers curious to see. Both should have been well served by the '94 Symposium at Flagstaff.

Across the spectrum, in between, the Symposium ranged from thoroughly practical classroom applications to the perennial summons for further research. The Keynote Address brought the membership up to date on relevant developments on the "Information Superhighway," envisioned dramatically by Jerry Ervin in a brilliant presentation. The broad question of computerized speech, of central and obvious relevance to CALL, was addressed in a number of presentations as this critically important aspect of the technology gradually matures.

The number of countries represented and languages addressed remains a gratifying symbol of the thorough internationalism of the field and of CALICO's place in it as the worldwide senior organization dedicated to technology and language learning.

The theme of the conference, "Human Factors," was powerfully addressed by Sallie Gordon's fascinating luncheon presentation. The report in these *Proceedings* actually complements her presentation, which will be remembered by those privileged to have attended it, as fascinating, funny, and painfully close to home when it comes to the practice of software development. Dr. Gordon at the very least sensitized the membership to the importance of the ultimate, practical, concrete realities of software employment by actual users, down to "click" and "double-click."

The purpose of an announced them such as "Human Factors" is not to restrict the variety of presentations which the field decides to expose to the public, but rather to provide an opportunity to look at one's own work from a particular perspective. In that spirit, there were no less than a dozen presentations which addressed Human–Computer Interaction, language lab ergonomics, instructional design, and user interface. If the membership grew conscious of the unconditional necessity of the application of "Human Factors" principles to the whole spectrum on courseware development, then the theme served the purpose.

Between the workshops, courseware fair, and presentations recorded in this volume, one is left with the overwhelming impression of the richness of the field, of a diversity of approaches, of a growing agenda, of expanding service, and new applications to surprising problems. As long as this scenario progresses as it has over the past decade, CALL will continue to provide excitement, delight, and educational innovation, and demonstrate that the marriage of language and technology is happy and fertile.

Frank L. Borchardt

Frank L. Borchardt
Executive Director, CALICO

PRECONFERENCE WORKSHOPS

MARCH 13, 1994 · NORTHERN ARIZONA UNIVERSITY

Getting Started in CALT

Presented by: Jack Burston and Frank Borchardt

The morning session of the workshop focuses on sketching out the subdomains represented by the various CALICO SIGs, giving an overview of the symposium agenda, providing a guide to essential sources of information on CALT, and surveying what electronic communication networks have to offer. The afternoon sequel, which can be attended independently of the first session, is devoted to the hands-on exploitation of the most readily accessible IBM-PC applications for the creation of classroom materials. Specifically, attendees work in pairs using simple word processing facilities to explore the potential of (alphabetic) text-based exercises for developing composition skills, enhancing reading comprehension, and providing various forms of text manipulation practice.

Jack Burston (B.A./M.A. in French Ph.D. in Linguistics) is Senior Lecturer in French, Department of Romance Languages, Monash University (Melbourne, Australia). He is presently completing, with wife Monique, a comprehensive CALL grammar French review program for use with intermediate/advanced level university students.

Frank L. Borchardt, Ph.D., is Professor of German at Duke University and Executive Director of CALICO. He also governs the project which has produced the **CALIS** and **WinCALIS** electronic courseware authoring environment.

Introduction to Digital Video: Hardware, Software, CALL Applications

Presented by: K. Bernd Conrad

The goal of this workshop is to introduce participants to digital video technology and its applications for CALL. The workshop will be held in the Language Learning Center at Northern Arizona University of which Mr. Conrad is the Director. The Center has state-of-the-art digital video peripherals, including four Macintosh computers equipped with video digitizing boards. Participants will learn about the hardware requirements for digital video recording and playback on student machines. Information on the cost of investments into the technology in the context of Learning Center set-ups will be provided. In addition, the hardware discussion will address mastering of digital video on CD-ROM as is possible with the Center's CD-ROM recorder. The hardware session concludes with a demonstration of digital recording from VCR and camcorder. The focus of the software session is on editing and storing digital video. **Adobe Premiere** editing software will be demonstrated and the compression issues will be discussed. The next to last session shows how digital video is processed in the popular authoring tool **HyperCard** and examples for CALL will be provided. Finally, participants have an opportunity for hands-on experience in digital video recording and editing.

Dr. K. Bernd Conrad is Director of the Language Learning Center and Assistant Professor of German at Northern Arizona University. His CALL specialization is development of interactive multimedia materials for Macintosh.

Using Libra to Author Interactive Video Programs on the Macintosh

Presented by: Robert Fischer, James Champion, and Michael Farris

This workshop focuses on the use of **Libra**, an IAV authoring system for the Macintosh **Libra*** has been presented at several conferences, including CALICO '91, CALICO '92, CALICO '93, CALICO International '93, the South Central Modern Language Association, the Texas Foreign Language Association, ACTFL, and FIPSE's Project Directors meeting. The authoring system has been very favorably received. The presenters instruct participants to use **Libra**'s

authoring tools to design effective listening comprehension programs based on current theories of information processing and second language acquisition research. These authoring tools enable faculty-authors to create icon button advance organizers; listening comprehension questions in true false, multiple choice, checklist, binary checklist, and icon sorting question formats with user-defined feedback tailored to each response option; hyperactive text displays, video scripts, dictionaries, and five different kinds of help displays. These tools also include simple and straight forward procedures to link lesson components together in a variety of ways and a videodisc editor to select and define relevant videodisc events.

* Development supported by a grant from the Fund for the Improvement of Postsecondary Education

Robert Fischer is Professor of French and Linguistics at Southwest Texas State University. His primary research interests lie in Applied Linguistics and CALL/IAV design issues.

James Champion is Professor of Spanish and Linguistics at S.W. Texas State University. His current research interests include computer applications in Spanish linguistics and IAV.

Michael Farris is Director of Media Services at S.W. Texas State University. He played a major role in the Time-Shared Interactive Computer Controlled Information Television project (TICCIT) and is presently involved in the development of hypermedia and IAV authoring books.

Multimedia Authoring with WinCALIS Author 2.0

Presented by: Richard Kunst, Fred Jacome, and Venkatakrishna Kuncham

This full day workshop is designed to increase proficiency and confidence level with the new **CALIS** (Computer Assisted Language Instruction System) 2.0 for **Windows**. This workshop will provide the hands-on experience needed to master **CALIS** authoring techniques in any of the world's languages, whether the target language is French or Japanese, Russian or Arabic. Activities will include: navigating Microsoft **Windows** 3.1; authoring basics — short answer, multiple choice, true/false, cloze, and free-form structures; writing your first exercise; multilingual editing using the **WinCALIS Unicode Editor**; introduction to the new **WinCALIS Multimedia Editor**; and adding digital MIDI or CD Audio, and digital or laserdisc video to your exercise. Time will be reserved for participants to share their experimental exercises and experiences and general discussion of issues in CALL authoring.

Richard Kunst is a Research Associate in the Duke University Computer Assisted Language Learning (DUCALL) Project, where he is developing full support for all the languages in the world in **WinCALIS** 2.0.

Fred Jacome is the Programming Manager at the Humanities Computing Facility, Duke University.

Venkatakrishna Kuncham is a Research Associate at Humanities Computing Facility, Duke University. His interests include graphical user interface design, windows programming, and computer graphics.

Computer-Adaptive Testing: What, Why, When, Where

Presented by: Jerry W. Larson and Kim Smith

This half day workshop will discuss the what, why, when, and where of computer adaptive foreign language testing (CATs). The Brigham Young University software shell, the engine of most current CATs, will be described along with the current uses of CATs at the college level for placement in French, German, and Spanish. CATs in the U.S. government focus on an entirely different purpose, testing general language reading proficiency in Dutch and Russian. Attention will be paid to the programming necessary to produce the shell and to the tests' overall design and tables of specification. The tests will be demonstrated to the participants.

Jerry Larson is Professor of Spanish, and Director of both the Humanities Research Center and of Foreign Language Testing at Brigham Young University.

Kim L. Smith is an Associate Research Consultant at the Humanities Research Center of Brigham Young University with over twenty years experience in language related computer research.

The presenters would like to acknowledge Pardee Lowe, Jr. and Danielle Janczewski for their contribution to the workshop.

CALICO COURSEWARE FAIR

MARCH 14, 1994 · NORTHERN ARIZONA UNIVERSITY

México Vivo, Quinze Minutes, Talking Poetry, and School for the Arts

Demonstrated by: Edna Amir-Coffin

Dr. Coffin will be showing Spanish interactive multimedia materials, **México Vivo**; French interactive multimedia materials, **Quinze Minutes**; Chinese interactive multimedia materials, and Hebrew interactive multimedia materials, **Talking Poetry** and **School for the Arts**.

Edna Amir Coffin is the director of Project FLAME and a Professor of Hebrew language and literature at the University of Michigan. She has designed and authored multimedia applications in Modern Hebrew Language and Literature, and is the design team director of the multimedia applications of Project FLAME (applications in Spanish, French, Chinese, Hebrew, Russian, Polish, and German). Dr. Coffin is an IBM consulting scholar (1988), the Vice President of the National Association of Professors of Hebrew (1989–), Coordinator of the Annual Conference on Methodology in the Teaching of Hebrew Language and Literature (1982–), and a Senior Research Scientist at the Center for Research on Learning and Teaching at the University of Michigan.

Authentic Discourse Based and Goal-Driven Language Learning or What Do You Do After You Turn The Computer Off?

Demonstrated by: Roger W. Andersen

This demonstration explains and illustrates the design and implementation of authentic discourse based goal-driven language learning, based on our experience with our Quechua interactive video project and following our Authentic Discourse Plus Model for foreign language instruction. Students of Quechua work with our two-hour interactive video material filmed in natural settings in Bolivia with a dual purpose: to learn spoken Quechua well enough to interact with speakers of the language in their own environment, and to learn about the social and cultural underpinnings of their society.

Roger W. Andersen is Professor of Applied Linguistics, University of California, Los Angeles, and Director of the Quechua Authentic Discourse Project. He does research on and teaches graduate courses on second language acquisition and natural spoken discourse.

Please refer to page 16 for a complete article on this subject.

Lecture: Author and Student Program

Demonstrated by: Robert Balas

I will discuss the design and operation of the program which provides a smooth, simple, but powerful tool to control and exploit laserdiscs. I will demonstrate the student self-instructional program and discuss the pedagogical rationale behind the program's structure, varied activities and emphasis on student input and problem-solving. I shall also show the flexibility inherent in the self-instructional program when used in conjunction with video and also discuss how the program can be used to create quickly classroom presentations as well as how it may be used in oral testing sessions. Examples from a beginning Italian program, **Buon Giorno, Italia** laserdiscs, from advanced programs to include *Welcome to Bellingham*, a laserdisc created at WWU for ESL and from "France-TV Magazine" or from the PICS' laserdisc *L'ABC de l'Economie*. I will conclude with a survey of the **Lecture** Authoring Program to demonstrate its ease of operation.

Robert Balas, Ph.D., Professor of French, FL Lab Designer and Director at Western Washington University, and Co-designer of a multimedia FL classroom. Coauthor, **Qu'est-ce qui se passe?**, a 2nd year French program. Author of six IBM software programs and of the **Lecture** Authoring System for developing CAV laserdiscs.

The Foreign Language TroubleShooters

Demonstrated by: Jay Bodine

The **Foreign Language TroubleShooters** is a template authoring system allowing ready computerization of language exercises. Coupled with the full-motion video capabilities of Intel/IBM's **ActionMedia II** under OS/2, the program allows a comparatively easy production of sophisticated exercises based upon digitized video. Writing an exercise entails easily recording a video clip and typing in the name of the video segment and the questions and answers you want your students to practice. The program compares student responses to the correct answers according to word order and typed characters, and guides the student to correct the incorrect aspects of the response.

Jay F. Bodine is an Associate Professor of German at Colorado State University. He is the principal author of the **Foreign Language TroubleShooters**, computerized exercises published for twelve text books (French, German, Italian and Spanish), and driver programs for the DOS, Windows and Macintosh systems.

Let's Talk! Communication Exercises for German

Demonstrated by: Klaus Brandl

In this presentation, I will demonstrate **LET'S TALK!**, a set of communication exercises for German. The content of the program deals with functional topics such as "At the Bus Stop" and "Arranging a Date" and grammatical topics such as prepositions in the accusative and dative, emphasis on word order, etc. The software's design is based on the concept of information gap exercises applying a variety of underlying language learning principles. Additionally, the program provides a learning environment that promotes the student's exploration of meaning through different kinds of on-line references and the use of error corrective feedback strategies.

Klaus Brandl (Ph.D., The University of Texas, Austin) is the Language Pedagogy Specialist at the University of Washington, Seattle, where he teaches courses in applied linguistics and language pedagogy.

The French CAT: Computer-Adaptive Test for French

Demonstrated by: Jack Burston

The French CAT is based on the Rasch Model of Item Response Theory. In accordance with an examinee's pattern of success or failure in responding to items of known difficulty, a continuously updated estimation is made of the probability of that person answering a harder or easier question correctly. Consequently, only a fraction of potential test bank questions actually need to be given to determine ability level with reasonable confidence.

Jack Burston (B.A./M.A. in French Ph.D. in Linguistics) is Senior Lecturer in French, Department of Romance Languages, Monash University (Melbourne, Australia). He is presently completing, with wife Monique, a comprehensive CALL grammar French review program for use with intermediate/advanced level university students.

Lernexpress I and II: An Interactive Macintosh Software Companion for the BBC Videodisc

Demonstrated by: Bernd Conrad

An interactive software companion developed in **HyperCard** for **Lernexpress I** and **II** videodiscs by Dr. Bernd Conrad, Director of the Language Learning Center at Northern Arizona University. The software engages students in a variety of interactive listening comprehension and vocabulary building exercise. Students can summon dictionaries and various visual or verbal clues as comprehension aids. The software keeps track of all learner input and output which can be written to the local computer or a network server.

Dr. Bernd Conrad is Director of the Language Learning Center and Assistant Professor of German at Northern Arizona University. His CALL specialization is development of interactive multimedia materials for Macintosh.

ORTHO-DIDAC

Demonstrated by: Lise Desmarais and Jean-Roch Roy

ORTHO-DIDAC is a software program designed to teach French spelling through the use of the spell checker, **HUGO**, and a cognitive based methodology. The development of this software was sponsored by the Treasury Board of the Canadian Government.

This program provides a test to evaluate the user's spelling proficiency. Depending on the results and the weaknesses revealed, specific work-related texts to correct errors are presented. Users are guided in their corrections to infer proper spelling. Feedback on errors not corrected help users learn lexical and grammatical spelling.

Lise Desmarais has a Ph.D. in education and is a specialist in language teaching at the Department of External Affairs of the Canadian Government. The software presented is a follow-up to her dissertation on developing a teaching methodology for French spelling using the spell checker.

Jean-Roch Roy is a computer science student at the University of Ottawa. He has been involved in authoring various computer based training programs.

Please refer to page 75 for a complete article on this subject.

The NEXTSTEP in Language Teaching: Designing Our Own Courseware

Demonstrated by: Courtenay Dodge and Milly Sánchez

At Allegheny College we are using the NEXTSTEP programming environment to tailor applications to our own courses and teaching styles. Our courseware is designed to simulate activities and experiences which place the language in a cultural context and which can allow students to engage in more active laboratory assignments where they can develop all four language skills using sound, images, and text. Our demonstration will focus on the development and use of two applications for teaching French. We will show how NEXTSTEP allows teacher and developers to work together to create easy-to-use didactically sound products.

Courtenay Dodge is Associate Professor of French at Allegheny College where she has been teaching all levels of French language and literature since 1972. Ph.D. from The Pennsylvania State University, 1976.

Milly Sánchez, graduated from Allegheny College with a B.S. in Computer Science and French in 1992. She develops Spanish and French applications and is the Language Lab Director.

Please refer to page 78 for a complete article on this subject.

Interactive Video Programming and Colorized HyperCard

Demonstrated by: Echo Farrow

This interactive **HyperCard** program and the videodisc *Hoosiers* combine to the "text" for an entire term of upper level writing instruction. The program focuses on rhetorical writing styles, writing skills, and literary techniques. Flexibility allows teachers to use the program according to their needs. The movie, about a small town basketball team that wins the state championship, contains a little romance and a lot of action, both of which interest the students and draws them into the process of learning.

Echo Farrow is a TESL Certificate candidate at Brigham Young University. She has worked as a computer consultant in a Macintosh Lab in BYU's Humanities Research Center and as a Writing Teacher for BYU's English Language Center.

In The French Body/In The German Body: Project Results

Demonstrated by: Carolyn Fidelman

In 1989, FIPSE (U.S. Dept. of Education) funded an unusual project whose goal was to promote a more holistic approach to language learning. In 1992, the project was completed and the computer-controlled videodisc materials were released to the language teaching public. What did the producer of this project learn about production of such materials and about language teachers readiness to embrace an approach involving the teaching of nonverbal language features? What have been the benefits to students? What are the current issues regarding

distribution and dissemination? The presenter will summarize the project, discuss the issues, and provide a demonstration of **In The French Body/In The German Body**.

Carolyn Fidelman is Project Director of **In The French Body** at the University of Massachusetts at Boston and has been a French Language Teacher at the postsecondary level for 18 years. She is Graduate Program Coordinator at the MIT Media Laboratory and has spent five years developing multimedia learning for clients such as IBM.

Libra: An IAV Authoring System for the Macintosh

Demonstrated by: Robert Fischer, James Champion, and Michael Farris

We will demonstrate how faculty-authors can produce IAV lessons by using **Libra**, an authoring system for the Macintosh. The demonstration will include showing how to use **Libra**'s authoring tools to create icon button advance organizers, listening comprehension questions (with appropriate feedback displays), hyperactive videoscripts, and dictionaries. We will also demonstrate sample lessons in French, German, and Spanish created by means of the authoring system.

Robert Fischer is Professor of French and Linguistics at Southwest Texas State University. His primary research interests lie in Applied Linguistics and CALL/IAV design issues.

James Champion is Professor of Spanish and Linguistics at S.W. Texas State University. His current research interests include computer applications in Spanish linguistics and IAV.

Michael Farris is Director of Media Services at S.W. Texas State University. He played a major role in the Time-Shared Interactive Computer Controlled Information Television project (TICCIT) and is presently involved in the development of hypermedia and IAV authoring books.

SuperMacLang, dh-glossary, and Annotext

Demonstrated by Otmar K. E. Foelsche

SuperMacLang: An authoring program with complete media extensions for construction of contextualized language learning activities.

dh-glossary: A glossary maker for the production of semiautomatic bilingual wordlists from French, German, Italian, and Spanish texts through the uses of masterlists produced by Dartmouth and Harvard. dh-glossary can also be used with Hebrew, Arabic, and Japanese.

Annotext: A multimedia authoring system for text based language environments with media extensions and dictionaries.

Otmar Foelsche has been Director of the Language Resource Center at Dartmouth College since 1987, and is an editor of the list LLTI (Language Learning Technology International.)

Signal Detection Analysis: What's Behind the Score

Demonstrated by: Major Francis M. Gahren

This demonstration will present a computer program used to collect data during an investigation of the vocabulary acquisition of advanced language learners. The purpose of this software was to record the extent of subject familiarity with a series of words learned during the four-month period of the study. Correlations between subject performance and perceived knowledge were used to conduct an analysis using the tenets of signal detection theory. Results portrayed not only the types of words learned and the level of lexical acquisition, but also the varying levels of the subjects over the length of the study.

Major Francis M. Gahren, Ph.D in Foreign Language Education conferred June 11, 1993, from the Ohio State University, is currently serving as Assistant Professor of French at the U.S. Air Force Academy, Colorado. Maj. Gahren's duties include faculty development, curricular issues, and integration of technology for foreign language learning.

Guided Reading: Hypermedia Annotation of Texts

Demonstrated by: David Herren

Guided Reading is an authoring system designed to simplify the annotation of texts using CD-Audio, color images, digital sound, digital videodisc, and of course, extensive textual annotations. In addition to the commonly taught western languages, it supports Arabic, Chinese, Cyrillic, Korean, and Japanese character sets. Its features include the ability to annotate any phrase long enough to be unique with a CD-Audio segment, 22 pages of text, a digital movie or segment thereof, digital sound, a full color image, and a videodisc segment — requiring no more sophisticated skills than the use of a television remote control.

David Herren is Special Assistant in Technology to the Vice President for Languages and the Director of the Language Schools of Middlebury College.

C'eravamo Tanto Amati

Demonstrated by: Richard M. James and David B. Carter

C'eravamo Tanto Amati combines vocabulary acquisition and listening comprehension through interactive video overlay in both PC and Macintosh environments. Brigham Young University has developed two interactive video supplements for second-year Italian students. Each version aesthetically pleases users within their accustomed environment. The PC version, written in **Toolbook**, uses Windows' in-line help, dialog boxes, and video overlay.

The Macintosh version, written in **HyperCard**, utilized new color options and new AV technologies for video overlay. This presentation will address topics: Why develop parallel courseware in both PC and Macintosh environments and how can distinctive programming environments diminish "computer shock" in students?

Richard M. James, M.L.I.S., Brigham Young University. Currently a student in a Spanish M.A. program, Richard develops courseware for the Humanities Research Center at BYU for first and second year students in Spanish and Italian. He has done programming since 1988 using **HyperCard** on the Macintosh.

David B. Carter, a senior in BYU's Spanish Translation B.A. program, has been involved in **ToolBook** development at BYU's Humanities Research Center for just over one year. His major emphasis has been the recreation of the interactive videodisc applications originally created for the TICCIT system.

Integrating Voice into CALL Programs

Demonstrated by: Jay Jones

Adding speech output and voice input to computer programs designed to assist in foreign language instruction is becoming more feasible. As voice technology advances, potential effectiveness of computer assisted foreign language instruction increases dramatically. This demonstration presents a glimpse of this potential by using low cost hardware and software to implement beginning level language programs in Spanish, French, and Russian. The approach is to tie many small, adaptable programs together synergistically.

Jay Jones, B.S.E.E. Utah State University, is a Procurement Engineering Technician at Spectra-Physics in Eugene, Oregon. CALL is his major hobby.

Please refer to page 138 for a complete article on this subject.

WinCALIS 2.0 and Graphical CALIS 1.0 for DOS

Demonstrated by: Richard Kunst and Raviram Medapati

WinCALIS 2.0: Multimedia demonstration of an internationalized multilingual, Unicode/ISO 10646-based **CALIS**, which can be used with equal ease to teach Japanese to Portuguese speakers in Brazil; German to Turkish speakers in Germany; English to Chinese speakers from either China or Taiwan; Arabic to French speakers in Quebec; or Russian to Americans in Arizona.

Graphical CALIS 1.0 for DOS makes it possible on any AT-compatible (80286 or above) PC with or without Microsoft **Windows** to run **CALIS** exercises which incorporate most of the enhancements of **Windows**. **Graphical CALIS** for DOS can present exercises written in the **CALIS** script language, including most **WinCALIS** scripts, in 16 colors, using a

variety of fonts and graphics. It provides the student with a livelier, friendlier user-interface than **Text CALIS**, complete with pull-down menus and mouse buttons, without the ponderous overhead and hardware requirements of Microsoft **Windows**.

Richard Kunst is a Research Associate in the Duke University Computer Assisted Language Learning (DUCALL) Project, where he is developing full support for all the languages in the world in **WinCALIS** 2.0.

Raviram Medapati is an Associate in Research at the Humanities Computing Facility at Duke University. His interests include creating authoring programs on less powerful machines.

Fonts and International Characters on PC/Mac

Demonstrated by: Ilona Lantos

Font basics will be demonstrated, as well as tools, and ways to get international characters and special symbols into various document formats (i.e., **WordPerfect**, **Windows Write**, **PageMaker 4.0**) and on different platforms (PC and Macintosh).

Several programs will be examined with different capabilities; **WordPerfect** (**DOS** and **Windows**), **Keymapper** (and **WorldFont**), **Gamma Universe** and **Language Link** (with its "language fonts"), and **Fontographer**.

Ilona Lantos is a language instructor of Hungarian at the National Foreign Affairs Training Center in Arlington, Virginia. She has a B.A. in Hungarian Language and Literature and in teaching English as a Foreign Language from Eotvos Lorand University, Budapest, Hungary, 1984. She also hold a Certificate of Completion in Desktop Publishing, 1991 and a Certificate of Completion in Graphic Arts Portfolio 1992, USDA Graduate School.

Please refer to page 143 for a complete article on this subject.

Hands Off! A Voice Interactive Multimedia System

Demonstrated by: LTC Stephen A. LaRocca and MAJ Casey A. Neff

This project modernizes and streamlines a voice-driven interactive multimedia system. The previous system was based on a Scott Industries SIR Model 20 speech recognition board. The current project replaces the $1500 Scott board with the $300 Aria Listener board from Sierra Semiconductors. This board offers a number of advantages; it has an improved user interface, it plays wave files and it plays all files at a much higher resolution. The most significant improvement for us is the interface, as it allows us to create a system completely independent of the keyboard or mouse, relying solely on voice commands.

LTC Stephen A. LaRocca, Lieutenant Colonel, U.S. Army, holds a Ph.D. from Georgetown University in Computational Linguistics. He is the Director of Educational Technologies for the Department of Foreign Languages at the United State Military Academy, West Point, New York.

MAJ Casey A. Neff, Major, U.S. Army, holds a Master's Degree from Cornell University in Russian Literature. He is an Assistant Professor of Russian in the Department of Foreign Languages at the United States Military Academy at West Point, New York.

Spanish and German I.A. and Testing Programs at BYU

Demonstrated by: Jerry W. Larson, Charles D. Bush, and Kim L. Smith

Montevidisco and **DiscoDeutsch**, two recently-completed interactive video programs for Spanish and German will be demonstrated. These programs are designed to enhance listening skills for students of intermediate-level Spanish and German. Also, computerized, adaptive placement tests developed at BYU for French, German, and Spanish will be demonstrated.

Jerry W. Larson, Director of the Humanities Research Center and Professor of Spanish at BYU.

Charles D. Bush, Senior Research Consultant in the Humanities Research Center at BYU.

Kim L. Smith, Associate Research Consultant in the Humanities Research Center at BYU.

Interactive Expeditions Into English

Demonstrated by: Joseph Martineau

Expeditions Into English (Glen W. Probst, Project Director) is an audio/video-interactive ESL tutorial with 41 lessons for beginning level students. **Expeditions** uses a completely colorized, user-friendly **HyperCard** platform to play color-illustrated dialogs, individual words, and complete sentences. **Expeditions** also presents many lessons in unique ways to keep the students interested. **Expeditions** also integrates the following.

- Recording/comparing: students actually *become* part of the dialogs and lessons, practicing pronunciation by comparing their speech with the original.
- Listening comprehension: students interactively practice listening comprehension by word or sentence.
- Quiz: practice an/or evaluation, using test, sound, and PICTS.

Joseph Martineau, Candidate, Linguistics B.A. at Brigham Young University, minor in Computers and Language. Materials Developer/Computer Programmer with the BYU TESL Department and Computer Consultant to the BYU Humanities Research Center.

Business Japanese

Demonstrated by: Yoshiko Saito and Thomas Abbott

Business Japanese, a **HyperCard** tutorial, uses a simulated business trip to teach functional Japanese. BJ features W. B. Travis' first trip to Japan, as he goes through immigration and customs into Japan where he meets people, checks in and out of hotels, has meetings, rides bullet trains, and more. The simulation has 70 screens with integrated dialogues, visual images, and extensive cultural information. Other modules present vocabulary and grammar notes, reading signs, and cultural information.

Yoshiko Saito is Assistant Professor of Japanese at The University of Texas at Austin. She earned her M.A. and Ph.D. from Ohio State University in foreign language education. She is active in Computer Assisted Language Instruction (CALI) and "Business Japanese" research projects.

Thomas Abbott is a management consultant. He heads up Abbott, Saito, and Associates. He has almost two decades of experience as a Japan specialist. His academic background includes a B.B.S. in Economics from Ohio State; M.B.A. from Southern Methodist University.

PracTest: A Language Practice and Testing Program

Demonstrated by Gary Smith

With **PracTest**, language teachers can create practice and testing modules for use in support of their instruction. In can be utilized for dictation, fill-in-the-blanks, multiple-choice, and limited free answer exercises. It also provides a research and diagnostic tool in that it can be configured to keep a record of incorrect responses and attempts to correct them. It provides the learner an immediate indication of errors and subsequently shows the correct answer.

Gary Smith is Associate Professor of German and Coordinator of Computer Assisted Instruction in the Department of Modern Languages and Literatures at the College of William and Mary, Williamsburg, Virginia.

Please refer to page 208 for a complete article on this subject.

Eine Reklamation: Interactive Video Project for Business German

Demonstrated by: Thomas Thibeault and Sandra Adams

Eline Reklamation is an interactive video program for business German developed in a joint effort between the Goethe Institute and Southern Illinois University. The software contains a hypertext version of the videodisc dialog. Students can click on unfamiliar terms to access translations or explanations. They can also click on individual sentences to

have the sentences repeated. Each unit contains five follow-up exercises focusing on content, listening comprehension and expansion of specialized vocabulary.

Thomas Thibeault, Ph.D., Universität Salzburg, is Director of the Language Media Center at Southern Illinois University. He develops hypertext programs for CALL and has presented papers on the topic.

Sandra Adams, M.A. in French, is pursuing a Ph.D. in Instructional Technology at Southern Illinois University. There, she assists in the development of multimedia projects in Language Media Center.

Development of Computerized Content-Based Learning and Reading Courseware Without Any Programming Skills: L&R Book Template For Foreign Language Professionals

Demonstrated by: Jon V. Varosh and John Lett

A demonstration of how students work on a **L&R Book** developed with the **Teacher's Template** in Spanish, Polish, or Greek, followed by a second demonstration of how foreign language teachers develop courseware (**L&R Book**) by using the **L&R Book Teacher's Template**.

Jon V. Varosh is an Assessment Applications Specialist at the Defense Language Institute Foreign Language Center. His responsibilities include designing and developing application programs to integrate computers into foreign language instruction, program evaluation, research, and testing. He has 14 years of experience in adult foreign language education.

John Lett is Director of Research at the Defense Language Institute Foreign Language Center, where his responsibilities include conducting and coordinating research performed at or for DLIFLC, including cooperative research projects. He holds a Ph.D. in Foreign Language Education from The Ohio State University.

Please refer to page 227 for a complete article on this subject.

A Trip to Poland

Demonstrated by: Waldemar Walczynski

The demonstration will show how the courseware is constructed, how it works, and its possibilities as far as student choices and on-line help are concerned. The participants will be encouraged to explore the courseware for themselves.

Waldemar Walczynski graduated from Lódz University, Poland and taught English for seven years. At present, he is working at the Center for Applied Linguistics. **A Trip to Poland** is his first electronic multimedia courseware.

Please refer to page 231 for a complete article on this subject.

Multimedia Programs From Idea To Product

Kent Andersen

INTRODUCTION

This presentation has three main purposes:

- to demonstrate different types of multimedia exercises used for language training,
- to reveal some of the considerations done during the development process, and
- to demonstrate some of the potential multimedia has when used for teaching a foreign language to a deaf student.

TYPES OF EXERCISES

Computers have been used for language teaching for quite a number of years. It seems, however, that only a limited number of types of exercises have been "invented." Often the students would even be better off with the same exercises on paper.

Vocabulary Training

There really is not any record of this; but I believe that the first type of exercise for language training on a computer was some sort of vocabulary training program. The user was presented with a foreign word or phrase that had to be translated by typing in an answer that was then controlled against one or more "correct" answers made by the author. The weakness of this type can be the lack of context and also the number of correct answers that are limited by the imagination of the software author. The vocabulary training exercises have been refined over the years, e.g. they can control the input letter by letter and thereby prevent the user learning a misspelled word.

Fill-in Exercises

This type of exercise has also been used for a number of years. Usually a word has been replaced by a box or line in a text, the user is then supposed to type in the missing word. This type of exercise is related to a context and it works much like a "Cloze test" the critics, however, claim that the exercise works more like an IQ test instead of teaching/training a foreign language.

"Empty-text"/Cloze-Exercise

This type of exercise is not used very often though it is simplicity itself. To make an "Empty-text" exercise you take every 10th word from a text and put into a word processor. The user's job is then to write a story (instruction, essay) using those words and at best in the same sequence. This type of exercise makes the students use their creative minds as they "page" through their active vocabulary to construct a story. Originally this exercise was used in drama training.

Multiple Choice

This type of exercise is usually used for controlling the student's knowledge. The student is presented with a number of answers to choose from. In itself the multiple-choice exercise does not train anything, but it is useful for testing the student's understanding of a text, video, or sound sequence.

Find the Correct Sequence

In this type of exercise, a story is cut into a number of pieces that are then mixed up. It is the student's job to find the correct sequence. The story can be a text, a sound sequence, or a video clip. One of the advantages of this type of exercise is that authentic "texts" can be used because the student does not necessarily need to understand everything to decode the message and then the correct sequence.

Adventure Games

Solving an adventure game can be a complicated task. However, adventure games made for language teaching can be a refreshing exercise. The student is presented with a situation which he can then deal with by typing in commands. Depending on the situation and other circumstances (like the sequence

of words used in the command), the computer responds to the student's input thus creating a surrogate conversation.

Hotwords

This is really not an exercise but more of a help tool for the student who is reading a text. By clicking on a hotword (or otherwise signalling an interest in the word) a student can get a translation, an example of the use of the word, a videoclip, a pronunciation, etc.

Listening Exercises

This was one of the first steps into the world of multimedia. The student uses his computer as a tape recorder. The computer can either have digitized speech on the hard disk drive or it can control a laserdisc player or a compact disc. The advantage is the immediate access to the sequence, unlike a tape that has to be rewound.

Pictures and Graphics

The computer's ability to display high resolution pictures and graphics is often used in exercises. The student is instructed to click on a particular part of the picture, and when he does so the computer registers where he clicked and then responds accordingly.

Drills

The "good old fashioned" language laboratory drills are transferred to a computer system. The drills can be text- or soundbased where the computer replaces the laboratory tape recorder. In the future, voice recognition software will also check the student's answers.

Video

The computer can play a video sequence either from the hard disk drive, from a CD-ROM, or by controlling a laservideo player. With a combination of subtitles and video, the student is given a maximum of information which can be used in many kinds of exercises.

All the mentioned exercises can (and ought to) be combined in multimedia language teaching systems. Learning a foreign language can sometimes be a tedious task, but by carefully drafting the lessons with a mixture of exercises the students find the lessons interesting and perhaps even entertaining.

CONSIDERATION

It is necessary to do a lot of consideration before starting on a multimedia programming project and finally, the project should either improve on the learning methods or decrease the overall costs of foreign language teaching.

Selecting the Right Materials

This is probably the most important part of the project. The materials should have the right level of difficulty, be interesting to the future users, if possible contain some humor, and be visual — remember that texts are usually better on paper! Also it might be ideal to look at existing materials that could be repurposed. Finally check on copyright. Some years ago IBM sponsored a project using interactive video called "Murder auf Deutsch." Unfortunately, the background music was copyrighted and the finished project had to be shelved!

Platform

It is also important to choose which platform to use (i.e., CD-ROM, DVI, CDI, laserdisc, bar-code, programming, and hardware [Mac or IBM]).

User Interface

The layout of the computer screen is very important but it is also important to choose between using a keyboard, a mouse, a press sensitive screen, etc.

Production Costs

Compare prices for making a CD-ROM, pressing a laserdisc, perhaps also programming existing materials if you cannot manufacture the item yourself.

Help

Identify who could help you through a project (e.g., technical assistance, programming, video recording, project management).

Marketing

Investigate how to get financial aid to the project (e.g. EU and other government funds). Odense Tekniske Skole is interested in finding new partners for future projects.

HOW TO TEACH DEAF STUDENTS ENGLISH

In the Danish educational system English is a compulsory subject for cabinetmakers' apprentices and for woodcutting machinists' apprentices. In both trades there are a number of deaf apprentices every year. These apprentices have equal rights to education according to Danish law and must therefore be taught English together with the other students. Multimedia can be a great advantage to these students who can now get texts, words, and instructions translated into sign-interpretation just by clicking with the mouse. The program for the deaf students is really just an "add-on" to the program used by the other students in the same classroom.

PRESENTER'S BIODATA

Kent Andersen is a member of the Multimedia Group at the Odense Tekniske Skole, Denmark. OTS has been using multimedia and computers in language teaching since the early eighties and a great variety of programs have been produced for that purpose including: grammar training systems, authoring systems for interactive video, CD-ROMs, etc. OTS has also been working on multimedia programming for Denmark's Radio (the Danish Broadcasting Corporation).

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BEST COPY AVAILABLE

AUTHENTIC DISCOURSE BASED AND GOAL-DRIVEN LANGUAGE LEARNING OR: WHAT DO YOU DO AFTER YOU TURN THE COMPUTER OFF?

ROGER W. ANDERSEN

The Authentic Discourse Plus (AD+) Model for foreign language instruction emphasizes student activities and tasks that are determined by well-defined short- and long-term goals. The UCLA Quechua Authentic Discourse Project has developed a two-hour interactive video program based on this model. It contains 20 scenes of natural interaction in the lives of villagers in a small village in Bolivia — Ucuchi — and in the nearby city of Cochabamba. The purpose of the interactive video material is to provide a model for the learning of Bolivian Quechua and, at the same time, provide insight into how speakers of Bolivian Quechua go about their normal daily lives, and how their actions are based on the cultural norms that guide their lives.

Following the AD+ Model we help the learners define reasonable short- and long-term goals for learning both language and "culture" in such a way that learning one promotes learning of the other. The long-term goals involve understanding the Bolivian Quechua life styles, belief systems, political systems, ways of making a living, etc. through working with the two-hour video. Since the language spoken in the video is Quechua, the only way for the learner to actually accomplish this long-term goal is to learn to understand the Quechua in these scenes. Thus learning the language is the result of working with the authentic film scenes to accomplish the goals defined in terms of learning about Quechua-speaking people and their lives.

This presentation explains the design and implementation of goal-driven language learning, based on our experience with our Quechua interactive video project. We will have the laserdiscs and software set up at a work station for hands-on navigation through our instructional material (called **Ucuchi**, after the Bolivian village where most of the film footage was shot). We will also show video clips from the use of **Ucuchi** in the classroom, in a class lab session, and in individual use at a work station. Additional print material will be available for those who would like more information about goal-driven language learning with authentic discourse based instructional material.

Although this particular implementation of the Authentic Discourse Plus Model is for the teaching of Quechua, an uncommonly taught but historically, culturally, and geographically important language, the model is applicable to the learning and teaching of any foreign language.

PLAIN VANILLA

We have chosen to use interactive video to make the content of the film accessible to the students and the teacher. The film was transferred to 1" videotape, from which the laserdiscs were pressed. As is well known, laserdiscs provide better quality images and sound than videotape and withstand frequent use in ways that videotape does not. The real benefit of using videodiscs, however, is that the users can control which portion they want to work with and, when they change their minds, move in seconds to wherever they wish on the laserdisc.

This same computer control allows for a dazzling array of additional ways to work with the language, visual images, and behavior in the film scenes. Our development strategy is to *not* use any of these dazzling tools until we are convinced that the particular tool (e.g., a vocabulary reference, a pronunciation exercise) is well suited to use on the computer, is the best way to accomplish what we want to accomplish, and is accessible to the learner. We thus initially developed a "plain vanilla" computer interface, providing the minimal tools for the user to access and interact with the film scenes.

We videotape selected Quechua classes, labs, and individuals working with **Ucuchi** to study how they use it *before* we put into it everything that is possible and everything that we as excited computer lovers would like to build into the computer control.

By doing this we frequently discover that students and teachers come up with some very productive ways to work with the material, ways we would never have thought of. We also discover at times that certain tools we think would be wonderful to have available don't get used.

A TOTAL AUTHENTIC DISCOURSE BASED CURRICULUM

Our long-term objective is to develop a completely authentic discourse based curriculum for the teaching and learning of Quechua, equivalent to a two-year university course. Our development work is done in layers and in a spiralling fashion. Following the "plain vanilla" philosophy, we first developed the basic essentials to give the user as much control as possible over the film scenes.

We then videotape students and the teacher working with this material and gradually add one new "layer" at a time. As we build more and more tools and possibilities into the curriculum, including the computer control, this causes us to rethink some of the earlier "layers" we developed. We then revise those layers and restructure the curriculum as it exists at that point.

In this fashion the curriculum is built from the ground up as it is being used by students and teachers, with spiraling "up" to add new layers, spiraling "down" to revise layers developed earlier, and spiraling "up" again to restructure the integration of layers.

We are developing a *curriculum*, not a stand-alone "listening comprehension" or "writing aid" computer-based add-on. We certainly value such tools, but we see **Ucuchi** as one of several modules in a larger curriculum and the existing tools available to the user on the computer as the beginning of a wider array of proven aids for the student to learn in a course where the laserdisc, the computer, and the classroom are all accomplishing the same thing.

WHAT DO YOU DO WHEN YOU TURN THE COMPUTER OFF?

We believe that it is the teacher, the students, and the authentic discourse samples that are at the center of the curriculum and the learning process. The computer plus laserdisc player workstation is an extremely valuable tool for facilitating this learning, but is always treated as simply that, a tool. In the curriculum we are developing, we use the computer plus laserdisc player workstation as a place for students to work closely with specific aspects of the video and sound in a particular scene (or several scenes) as preparation for meaningful communicative work *in class*. The work on the computer thus *serves* the work in class. The students eventually know when they have worked enough on a particular task by how well they are able to use the language, discourse, and content after they have turned the computer off. Students work toward short and long-term goals and accomplish tasks at the computer and away from it, ranging from short and simple, to very complex, all to prepare them to do meaningful work in the classroom.

It takes a long time and a lot of complex work to design the set of short- and long-term goals, tasks, and activities that guide the students in their work. This development work is done *interactively*. That is, we are constantly videotaping students and teachers using the current set of materials, interviewing them, and having them evaluate the materials and their use, *while* we are developing them. The result is a product that provides a close match to students' and teachers' real needs and preferences. But we also build into the material ways to teach students and teachers how to work with authentic discourse in ways they never imagined.

The first version of **Ucuchi** was released in mid April 1994. We will release upgrades every six months as we continue our development work.

PRESENTER'S BIODATA

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SHURIK, VASYA, AND QUICKTIME: DIGITAL VIDEO AS AN ALTERNATIVE TO LASERDISC

DEVIN N. ASAY

INTRODUCTION

Digital video is a promising new technology that is revolutionizing information delivery. In essence, it allows the storage and playback of full-motion video material on the personal computer. One of the implications of this development is that we can now employ video materials for language instruction and enjoy an unprecedented level of control and portability, free from dependence on bulky, expensive external equipment, such as videodisc and videotape players and monitors.

As with any new technology, however, this one comes with its own set of challenges and frustrations. At this stage in the development of digital video technology, we who choose to use it must be willing to make some compromises to realize the benefits. These compromises include accepting reduced size and quality of the video image and committing resources to handle the enormous storage demands of digital video. Yet the advantages, including reduced expense for user workstations, increased portability, and ease of modifying and duplicating the video material, more than offset the disadvantages.

This paper will discuss some of the considerations for developers who are deciding whether to choose digital video over laserdisc. It will also discuss techniques and problems associated with the process of converting a laserdisc-based application to digital video.

HISTORY: WHY DIGITAL VIDEO?

In 1986 as a graduate student at Ohio State University, I began experimenting with CALL development. One of the first projects I became involved in was exploring the feasibility of a relatively new technology: computer-interactive laserdisc. This technology held the promise of allowing nearly instantaneous access to any video or audio segment on the disc, permitting the developer to conveniently use any utterance or visual image in teaching a grammatical concept, new vocabulary, or cultural point. The possibilities seemed limited only by imagination.

For this project our development team chose an episode from a series of educational films produced by the Pushkin Language Institute in Moscow: *Shurik, Vasya and the Verb*. As the name implies, the films illustrated Russian verb usage — a traditionally difficult area for adult learners of Russian to master — in fairly natural situations at near-normal speech rates. Over the next several years we developed several prototype programs using this video material. The earliest prototypes were produced on IBM InfoWindows systems; by 1991 we had moved to the Macintosh platform using **HyperCard**.

In most ways the potential of interactive video was realized in these development prototypes: we had been able to access very specific video segments and integrate them into the computer based lesson. However, after completing the last **HyperCard** prototype and evaluating it with students, our development efforts came to a halt. Two factors precipitated this: First was the fact that very few potential users (public schools and universities) had the necessary equipment — a laserdisc player and video monitor — in their computer labs. Second, the high cost of producing laserdiscs was out of reach given our limited resources (mastering a singledisc costs around $1800 per side).

When Apple Computers introduced its new digital video standard, **QuickTime**, in 1992, I began to realize that this might be the solution to the problems that stopped development of the earlier version of the *Shurik and Vasya* interactive video program. By 1993 the quality of the **QuickTime** system software and development tools had improved enough that I felt the project could be done at a reasonable cost using off-the-shelf hardware.

In determining whether or not to attempt a **QuickTime** version of this project, I found it useful to look at the advantages and drawbacks of both videodisc and digital video. I came up with the following lists:

VIDEODISC

Advantages

- High quality video: sharper, clearer image as compared to videotape, with little or no degradation over time.
- Easy to run from any computer; no system performance degradation: requires only an inexpensive cable and software videodisc drivers.
- Video materials can be used very flexibly: quick, random access, play selected segments, etc.
- Two separate audio tracks: useful for having, e.g., the sound track plus a "clean" studio recording or a second language sound track.

Drawbacks

- Expensive to produce: $1800\side plus copies.
- Limited production runs can make discs hard to find: all copies must be made when the master is made; a second production run requires paying the mastering costs again. How can one predict how much demand there will be?
- Relatively low density: 30-60 min/side, depending on format.
- Requires expensive, bulky external player: a good player capable of interactive use of both major disc formats can cost up to $1700.
- Requires either external video monitor or internal video overlay card: external monitor takes up desk space in lab; either is a significant added expense.

QUICKTIME DIGITAL VIDEO

Advantages

- Delivered from same source as program: (Hard Disk or CD-ROM).
- Relatively simple, inexpensive production: **QT** movies can be edited using digital editors, allowing access to digital editing and effects.
- Integrated presentation; user does not have to divide attention between screens: saves desk space and expense.
- Video materials can be used very flexibly: Quick, random access, play selected segments, etc. with a higher degree of programmer control than videodisc.
- Built-in software control interface, easily modified: with videodisc programmer must create software control interface.
- Up to 99 audio tracks: potential for multilingual sound tracks.
- Text track: allows display of text of the sound track, synchronized with the audio.

Drawbacks

- Lower quality video: since video is displayed to screen directly from the hard drive or CD-ROM, video must be compressed to increase throughput speed, resulting in some loss of detail and reduction in number of colors displayed.
- Reduced video size: needed to reduce the size of video files, thus increasing throughput and enabling smooth playback.
- Requires large amounts of storage: a 30 minute video can require hundreds of megabytes.
- Will not run adequately on slower computers (for Macintosh, slower than IIci): another throughput speed issue.

On balance there was much to recommend about digital video, especially since the major drawbacks are rapidly becoming less of an issue. As desktop computers become faster and compression/decompression algorithms improve, it soon should be possible to play back full screen, full motion digital video using unmodified PCs. The other drawback of digital video, large storage requirements, is being mitigated by the ever-falling price of high-capacity storage devices.

HARDWARE AND SOFTWARE CONSIDERATIONS

After determining to undertake the conversion from videodisc to digital video, I also decided that I wanted to see what could be done using off-the-shelf computers and inexpensive digital capture hardware. After all, one of the stumbling blocks in the earlier videodisc project was the prospect that most potential users could not run the software without purchasing special equipment. For video capture I used a Macintosh Quadra 700 with 8 megabytes of RAM and the inexpensive SuperMacVideoSpigot NuBus video digitizing card. For storage of video data I used an external 1 gigabit hard disc drive to supplement the 230 megabyte internal drive. For video editing and compression, I used a Macintosh Quadra 660AV with 12 MB of RAM (you will need at least 12 MB of RAM if you use Adobe **Premiere** for video editing). The resulting digital video can be played on any stock color Macintosh, although realistically it needs the speed of a Macintosh IIci (25 MHz 68030 CPU) or greater.

The software I used is widely available and relatively inexpensive: **ScreenPlay** video capturing software, which is included with the VideoSpigot, Adobe **Premiere** version 3.0 for digital editing and compression, **HyperCard** version 2.2 for creating the instructional software and movie control interface, and the **QuickTime Developer's Kit**, which includes the external commands (XCMDs) that permit playback and control of **QuickTime** movies from **HyperCard**. In addition, each Macintosh system was running at least version 1.6 of the freely distributable **QuickTime** system extension, which allows the Macintosh to create and play digital movies in the **QuickTime** format.

My choice of **HyperCard** as a development environment was based on my familiarity with the product as well as its flexibility; the **QuickTime** XCMDs allow a great deal of control over the movies you create. However, other authoring environments, such as **Authorware Professional** and **Director**, also make it easy to incorporate **QuickTime** movies into your courseware or presentations. I chose Adobe **Premiere** for editing and creating **QuickTime** digital movies, because it seemed to be the most powerful and easy to use editing software for the non-professional.

THE PROCESS

The time requirement is an important consideration when deciding whether to invest one's labor in creating digital video. It was one of the biggest question marks I had before I started this project (the other was how much storage space I would need for my **QuickTime** movies). The digitizing process can be broken down into three major steps: video capture, editing, and compressing. I did the capturing on a Quadra 700 and the editing and compressing on a Quadra 660AV.

Using the equipment I have described, video capture may be done in "real time" as the video is playing. Therefore time required for the capturing step is equal to the length of the video material, plus incidental time for setting up, saving captured files, finding starting points on the video, etc. In planning for capture time, a good rule of thumb is to allow two to two-and-one-half times the length of the video to be captured.

If your computer setup will permit, it is probably best to capture at a window size of 320 X 240 pixels and as high a frame rate and color bit depth as possible. (See "Getting the Best Results" below for a discussion of these concepts.) Even if you reduce the size and frame rate when you save your final version of the movie, having more video information available in your captured raw file will ensure that the compression method you choose gives you the best possible result.

The time required for the editing step can vary widely, depending on the intentions of the user: if one is simply taking existing video and digitizing it, editing time may be negligible; if one wants to create elaborate titling and transition effects or must repair defects in the original video, editing can take many hours.

The final step, compression, involves setting various characteristics (see "Getting the Best Results," below) of your **QuickTime** movie, selecting a compression method, and saving the movie to disk. When using the Cinepak CODEC (short for "Compression/Decompression component) which is the CODEC recommended for smoothest playback from CD-ROM, I found that the compression step took about 1.25 minutes for each second of video. Due to this and other factors (mainly that it takes less time to open and begin playing a shorter movie than a longer one), I created and compressed movies in short segments of from one to three minutes. All told, the entire 16-minute video episode I digitized required over 20 hours just to compress.

For this, my first effort in creating digital video, I worked nearly full time for a little over two weeks. Some of this time was taken up with familiarizing myself with new software and hardware and the trial and error process of determining how to achieve the most favorable results. Thus, a second project of similar scope might take less time. In addition, newer, faster computers, such as the PowerPC-based Macintoshes, should cut compression time significantly. Still, the digitizing process remains a time-intensive one.

Just as important as the time involved is the amount of storage needed for digital video production. After my experience I would recommend one gigabyte of hard disk space as the minimum needed for a project of any significant size. I found that I required around 600 MB to store the "raw" (uncompressed) digital video files. After compression, each minute of video occupied about 5.5 MB of disk space. The final, compressed version of my 16 minute video occupies approximately 112 MB of disk space.

GETTING THE BEST RESULTS

To produce the best possible balance of video quality, storage requirements, and playback performance one must become familiar with several characteristics that can be set by the editing software. I based my final choices partly on my own experimentation and partly on very helpful suggestions given in the *Premiere User Guide*.

Movie Window Size

There are four sizes that are commonly used and that maintain the standard NTSC video width-to-height ratio of 4:3. These are, measured in pixels:

- 180 X 120 (very small, generally not suitable for instructional applications),
- 240 X 180 (occupies about one eighth of a standard screen),
- 320 X 240 ("half size," fills one quarter of a standard screen), and
- 640 X 480 ("full size," fills entire standard size screen).

I chose 240 X 180, which provided adequate video size, and smoother playback than the next larger size, 320 X 240, while giving a sharper image by reducing some of the artifacts of the original film, such as camera wobble, shimmering, color bleeding, and flaws on the film.

Frame Rate

Frame rate is the number of frames shown per second of video. As you may know, the human brain can perceive visual images of durations of one tenth of a second or longer. For this reason any moving video image that is shown at the rate of around 10 frames per second or less will appear jerky. To avoid this, motion pictures are filmed at 24 frames per second and videotapes are taped at 30 frames per second. I have found that it is best to capture video at as high a frame rate as possible, preferably 30 fps (the setup I described above can do that.) However, when compressing and saving, I have used 15 fps. The result, I find, is quite acceptable in terms of smoothness of playback. Saving at the lower frame rate also means that the movie will require less storage space and that there is a greater probability that it will play back smoothly on most color Macintoshes (less data to read, decompress and play back from the hard drive means less a lower likelihood of skipping or dropping out of frames).

Color Bit Depth

Color bit depth refers to the amount of memory your computer is able to devote to the video display and affects the number of different colors that can be displayed at one time. Typical bit depths are 8 (256 colors,) 16 (65,536 colors) and 24 (16.8 million colors) bits. For both capture and compression I found 16 bit video gave the best results for the equipment I was using. This does not, as one might think, create a problem when trying to play back a movie on a computer that is limited, as most Macintoshes are, to 8-bit color, since the **QuickTime** software will automatically display the movie at the maximum possible bit depth for that computer.

Key Frame

The *Premiere User Guide* recommends setting a key frame when creating your movie. This increases compression and playback speed, but can cause delays in accessing individual frames in movies. I set the key frame to one every 15 frames, as recommended for a frame rate of 15 fps, but did not experience this problem.

Data Transfer Rate

Data transfer rate represents the speed at which movie data is transferred from the storage device to RAM. I used 200 KB per second, the rate recommended for playback from CD-ROM. I found it resulted in smooth playback from both CD-ROM and hard disk.

Compression Method

There are several compression methods available, but the one that produced the best results was the Cinepak CODEC, which is designed to give the best playback for full motion video. Again, for playback from CD-ROM this is the best compression method. It has the added advantage of significantly reducing — by three times or more — the amount of storage space the movie requires. The main drawbacks are that the compression takes a very long time, as explained above, and that it produces a slight loss of video quality.

CD-ROMs

CD-ROM has become an inexpensive and convenient medium for delivering large amounts of computer data. With the cost of writable CD-ROM drives dropping below $5,000., many university media services units may have such drives available for creating CD-ROMs at low cost. This is an inexpensive way to test how your **QuickTime** movies will play from a CD-ROM without putting out the cost of mastering a commercial CD-ROM with copies. (I can have 300 commercial quality CD-ROMs produced for $1,000 at a local company.) For an outlay of about $25–$70 for materials and $45 for labor — I was able to test the concept of storing movies on CD-ROM while running the software from the hard drive. The results were very satisfactory; the difference between running the **QuickTime** movies from the hard drive and from the CD-ROM drive was almost unnoticeable. If I now decide to have the disc commercially mastered I may do so with the confidence that it will work properly, and that I don't have to pay $1,000 or more for an experiment that may leave me with 300 useless discs.

PROBLEMS ENCOUNTERED

Like any complex project, this one presented a few hurdles. The most vexing problem showed up when I was capturing video segments with audio, especially longer segments. The video and audio tracks would de-synchronize, so that the video would get progressively farther ahead of the audio. I discovered that this is an inherent quirk of **QuickTime** 1.6. I compensated for this problem by opening both the video and audio tracks in **Premiere**, establishing synchronization points for each, and manually matching up the tracks, a very time consuming and painstaking process. The problem may be resolved when the new version of **QuickTime**, version 2.0, comes out, probably by the time you read this.

The other hurdle I should mention is simply the learning curve for using the **QuickTime** XCMDs and **Premiere**. This is partly the unavoidable result of learning a whole new set of concepts associated with a complex technology. The user instructions for the XCMDs are rough and presume a fair amount of knowledge of **HyperCard** and its scripting language, HyperTalk. (I should mention that **HyperCard** version 2.2 comes with a new set of **QuickTime** XCMDs with somewhat improved documentation, however these XCMDs do not seem to offer the level of control over the movie that one gets with the **QuickTime Developer Kit** XCMDs.) The *Premiere User Guide* is much better, but still requires study before you become proficient with the program.

It is my hope that this account of my own foray into **QuickTime** development will help others avoid some pitfalls and get on their digital feet more quickly. After having explored this technology and produced prototype courseware using digital video I am convinced that it is a worthwhile technology that is becoming more and more feasible to employ as computer hardware and software improves and prices fall.

A WORD ABOUT COPYRIGHT

Technology advances have made it very easy to digitize all manner of materials: audio, graphics, video. It is thus very easy to infringe on copyright when we digitize these materials. Just because one can copy something does not mean that one may copy it. Even in an educational setting the definition of "fair use" is fairly restrictive. For any project that goes beyond one-time use for research or teaching it is best to obtain written permission for using the material from the copyright holder before proceeding too far, certainly well before distributing or marketing any software that uses digital copies of original materials.

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PRESENTER'S BIODATA

Devin Asay holds a Master of Arts degree in Russian Language and Literature from The Ohio State University. He began working on Russian CALL projects in 1986 as a graduate student and has been working full-time in CAI development since 1990, first at Ohio State University, and since 1992, at Brigham Young University. He has developed hypermedia courseware for several languages, including Russian, Chinese, and French, working primarily with **HyperCard** and **Authorware Professional**. He has also been involved with overseeing development and evaluation of CALL projects at BYU. Although he has done extensive work with interactive laserdisc development, this is his first venture into digital video.

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COMPUTER SIMULATED MICROWORLDS IN SECOND LANGUAGE LEARNING

FRANKLIN I. BACHELLER

INTRODUCTION

Second language learning requires integrated constructivist and instructional teaching-learning methods. Technology can be effective in the language learning process by providing rich contexts that support students in constructing knowledge and by providing instruction relevant to student understanding of the contexts. "Traveling to Yellowstone" and "Registering for Classes" are two **HyperCard** simulations that illustrate this use of technology in second language learning.

HOW SECOND LANGUAGE IS LEARNED

Larsen-Freeman (1991) summarizes second language research. She points out that language learning involves the following.

- Transfer from the learner's native language, e.g., cognates and similar structures (Wode 1978).
- Rule formation. Evidence of this is over-generalization [I eated it], redundancy reduction [He go], and communicative strategies (Chomsky 1965).
- Input that comes from interaction with other speakers and with the environment (Gasser 1990).
- Stages of language development involving increasing approximation and complexification of the target language (Selinker 1972).

Two other important concepts addressed by Larsen-Freeman are comprehensible input (Krashen 1985) and comprehensible output (Swain 1985). In order to understand, the learner must have for semantic processing input that is mostly comprehensible. Comprehensible output is necessary so that the learner can move from semantic to syntactic processing. Thus learner production of the language is as important as learner reception of the language.

From the foregoing, it is clear that language learners:

- rely on experience (e.g., what the learner already knows about language based on experience in his/her native language),
- approach the learning task cognitively (as evidenced by rule formation and the employment of learning strategies), and
- require comprehensible, environmental input to achieve the ability to receive and produce the language appropriately at various levels of use and in various social contexts.

Effective second language learning involves functional knowledge constructed from experiences as well as knowledge of linguistic elements gained, at least in part, through instruction.

CONSTRUCTIVIST IDEAS IN SECOND LANGUAGE THEORY

Constructivist ideas pervade second language theory. Legenhausen and Wolff (1990) state,

> ...authentic and purposeful language use is one of the utmost and important prerequisites for language learning...the principle that language learning is language use has become an important general criterion for the evaluation of the computer's contribution to the language classroom.

The philosophy that language learning results from authentic and purposeful language use is constructivist. Another concept, communicative competence, is constructivist when it:

- recognizes the classroom as a social context for learning,
- sees the making of meaning in language as a collaborative endeavor, and

- recognizes that collaborative endeavor involves communication strategies of asking for information, clarification, circumlocution, and other linguistic and extralinguistic resources needed to negotiate meaning (Savignon 1991).

More constructivist ideas are embedded in communicative tasks in the classroom that, according Nunan (1991):

- emphasize learning to communicate by interacting with others in the target language,
- introduce authentic texts into the learning situation,
- provide opportunities for learners to focus, not only on language, but also on the learning process itself,
- enhance the learner's own personal experiences as important contributing elements to classroom learning, and
- attempt to link classroom language learning with language activation outside the classroom.

Communicative interaction, authentic texts, experiences, language activation outside the classroom, collaborative endeavor, social contexts, interaction in the language, and communication strategies are all terms that fit well within the realm of constructivist approaches to learning.

TECHNOLOGY AND SECOND LANGUAGE LEARNING

Studies on the effectiveness of computers as instructional tools for second language learning have been inconclusive (Dunkel 1991). However, if computers and related technology are used to provide rich contexts that support students in constructing knowledge, they might be more clearly effective (Winn 1991). Effective systems would have multimedia and hypermedia platforms, and would provide the learner with multiple views, and multiple approaches to practical and theoretical knowledge. These systems would be seen as information providers and not as tutoring systems (Chiou 1992).

Information providing technology according to Bagley and Hunter (1992), would increase learning effectiveness by:

- leading to greater retention and higher-level thinking,
- putting learners in control of their own learning,
- increasing learning time, and
- encouraging problem solving, reflection, collaboration, independence, and creative and critical thinking.

TWO EXAMPLE SIMULATIONS

An integrated constructivist-instructional methodology combined with a multimedia-hypertext, information providing platform can establish a rich second language learning environment. "Registering for Classes" and "Traveling to Yellowstone" are **HyperCard** based simulations designed to establish this rich environment and intended to demonstrate how second language learning can be achieved through the employment of simulation, instruction, and collaborative learning.

Description

"Registering for Classes" simulates the procedure students go through to register for classes at Utah State University. Students collaborate in small groups to discover the registration procedure. They interact with the program by listening and reading and by clicking on icons or text. Students interact with each other as they decide appropriate responses such as which steps to take and which buttons to click. To register successfully, students must discover through trial and error the order of the steps (see Figures 1 and 2).

Figure 1. Students discover the procedure. They click on pictures to navigate through the program.

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Figure 2. Students watch video; they listen and then respond by clicking on an appropriate response.

In "Traveling to Yellowstone", students plan a 4-day, 3-night trip to Yellowstone National Park. Students collaborate to make choices regarding transportation, lodging, food, and activities. They are given a random amount of money to spend on their trip and are instructed to spend, but not overspend, all of their allotted funds (see Figure 3).

Figure 3. Instruction is tied to context.

The programs share a number of similarities. Students navigate through the programs primarily by clicking on color pictures. The programs communicate linguistically with students through sound and text. Students respond to this communication by clicking on an appropriate written response displayed by the program. **QuickTime** video, usually with an accompanying soundtrack, conveys extended information to students.

Learning Activities

The simulations assist in the second language learning and acquisition process by providing conversational listening and speaking, writing, and reflection activities as well as instruction.

Reflection

Students can be asked to reflect on the learning process, discussing in conversation or in writing procedures, expressions, grammar, vocabulary, etc. they learned from the simulations. They can also be asked to discuss the effectiveness of the simulations in helping them develop their English ability.

Instruction

Instruction, when available, is indicated by icons or by text. All instruction relates directly to the immediate context of the simulations and is aimed at enhanced understanding of the language. The instruction focuses on meaning conveyed by grammar and vocabulary. There is also some instruction concerning levels of speech.

Role of the Instructor

The instructor facilitates and evaluates. Teacher delivered instruction is indirect and comes as the instructor answers students' questions, provides alternate ways of saying things, provides feedback on oral and written work, etc. Also, the instructor assists in language development by conversing with students as they carry out various group and individual tasks and as they receive feedback on their performance.

Evaluation

Evaluation is conducted at two levels. At one level, the instructor is interested in how well students grasp the content, grammar, and vocabulary of the simulations. At the other level, the instructor is looking for increased language proficiency that comes as a result of students listening, speaking, writing, thinking, and collaborating while they do the simulations and related work.

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The instructor builds portfolios of student work by maintaining video recordings of students collaborating, for example, or of them relating processes. Written work is also included in the portfolios. The instructor reviews portfolios with students, pointing out strengths in their work and offering advice and correction aimed at helping them improve their overall second language ability.

CONCLUSION

Second language learning is a complicated process. Learners must accomplish many integrated tasks to learn a language well. They learn sounds and words; they learn a grammatical code; they learn elements of discourse; they learn to speak, to listen, to read, and to write. They learn to relate the linguistic to the extralinguistic. They learn a culture and learn how to speak and act appropriately in various social contexts within that culture.

Language as a whole is too complex to be taught. Students must learn language by themselves in rich environments conducive to experiential learning. The supplying of these environments is an important role technology can play in second language learning.

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A PROGRAM DESIGN TO GAIN CONTROL OF CAV FORMAT LASERDISCS FOR SELF-INSTRUCTIONAL AND MULTIMEDIA CLASSROOM USE

ROBERT BALAS

ABSTRACT

Essentially, the Macintosh version of **Lecture** was created to provide a self-instructional vehicle for the student to gain total comprehension and mastery of the language and culture on CAV format laserdiscs. Using the classroom to exploit video produced by native speakers for native speakers tends to present too many obstacles for the student to gain total mastery and for the instructor in terms of time constraints to permit adequate utilization of such a video for mastery in the classroom.

Our first objective was to provide the student with the means to raise his/her understanding to 95-100% of the spoken target language. As the program developed, we saw the need for variety and breadth in the self-instructional program in order to enable the student to explore and practice language comprehension. The final versions of the authoring and student programs were determined by a desire to meet three needs: language enhancement through problem-solving, creation of a hyper-environment which would permit a variety of activities built around selected video segments, and ease of program creation through the **Lecture** authoring system based on typing supported by some use of the mouse.

The task required both an overall student program design and an authoring program which facilitated the ease of development of varied and demanding student input activities. The result of this effort was the creation of the **Lecture** authoring program which permits the exploitation of CAV laserdiscs through simple typing and "point and click" lesson production.

The design and operation of the program provides a smooth, simple, but powerful tool to control and exploit laserdiscs. The student self-instructional program and the pedagogical rationale behind the program's structure provides varied activities and emphasis on student input and problem-solving. The flexibility inherent in the self-instructional program in conjunction with video can be used to create classroom presentations as well as oral testing sessions. A survey of the **Lecture** authoring program to demonstrate its ease of operation concludes the presentation.

PRESENTER'S BIODATA

Dr. Balas, a professor of French at Western Washington University and co-author of the French text *Qu'est-ce qui se passe?*, has been developing second-language teaching materials and experimenting with innovative teaching methods since 1974. He has created seven software programs for the IBM, including one interactive program that interfaces with IBM's **Linkway** and **LinkwayLive**. He was instrumental in the design and creation of the *Welcome to Bellingham* laserdisc as well as the **Lecture** authoring system for the Macintosh. He has designed and directed a foreign language video/computer laboratory for the past six years and has had extensive experience in using software, video, and interactive video programs with second-language students. With Dr. John Underwood, he is working towards a master's level program to assist second-language teachers in using and integrating technology, video/computer labs, and innovative teaching methods.

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E-TALK: CONVERSATION IN SLOW MOTION — AN UPDATE

MARGARET BEAUVOIS

ABSTRACT

This study examines the oral and written competence of students in intermediate French classes using a local network (LAN) to create a synchronous real-time discussion in the target language. The focus of this presentation is an examination of the resulting computer transcripts and videotapes of the classroom interaction. Student production in the two environments was studied for patterns of discourse, quantity, and quality of student output as well as linguistic and affective benefits to the learners. The presentation includes examples of student production on the LAN and videotapes of their in-class interaction with each other and their instructors. These analyses are examined in terms of establishing the effectiveness of this type of computer intervention in improving the intermediate language student's acquisition process.

PRESENTER'S BIODATA

Margaret Healy Beauvois, Ph.D. in Foreign Language Education from the University of Texas, M.A. in French from Middlebury College, is currently Coordinator/Supervisor of the French Language Program at the University of Tennessee at Knoxville. Her area of research is computer assisted classroom discussion using networked computers. She also does teacher training in Cooperative Learning, the integration of video into the foreign language cirriculum, and teaching of the semi-immersion method French in Action.

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LET YOUR COURSEWARE SHINE — PUT IT ON A CD-ROM

TADEUSZ BEBENEK

ABSTRACT

The presentation builds around a log of activities which took place while developing a set of multimedia, CD-ROM based courseware sets for Russian, Ukrainian, and Persian Languages at Duke University. The audience gets an inside look at the process of starting the project, assessing and gathering required resources, designing actual lessons, preparing video and audio materials, and finally putting everything together and transferring it to the CD-ROM medium.

Although the presentation discusses some issues of the screen design and human-computer interface in designing foreign language instructional materials, more stress is placed on discussing human factors from the developer's perspective. In the minds of most courseware developers, digitized video, audio, and CD-ROM publishing still belong to the domain of software gurus and technical wizards. One of the goals of the presentation is to prove to the audience that this is not necessarily true and that the amount of work required and the level of difficulty for such a task is comparable with that of putting together a monthly newsletter.

PRESENTER'S BIODATA

Tadeusz Bebenek is a Data Processing Specialist at the Humanities Computing Facility at Duke University.

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Scanning the Skies for Foreign Language TV and Radio Signals

Donald A. Becker

ABSTRACT

The purpose of this presentation (which, based as it is on experience gained with my own backyard dish, should probably bear the title "Diary of a Satellite TV Couch Potato!") is to survey the wide range of foreign language broadcasting — both television and radio — that is currently available to American foreign language teachers from the many geostationary satellites whose footprints include all or part of the continental United States and to evaluate various satellite system upgrades in terms of the added foreign language viewing and listening choices they make possible.

Assuming that the entry-level satellite dish and receiver are equipped to receive only unencrypted signals from the C-band satellites located between 69 degrees W (Spacenet 2) and 137 degrees W (Satcom C1), I shall outline the rewards (in terms of expanded foreign language program choices) that are to be achieved by adding such improvements as a KU-band upgrade, a Videocipher RS decoder module, a horizon-to-horizon dish mount, a global feed (i.e., one capable of receiving circularly polarized signals in addition to linearly polarized ones), and an SCPC (Single Channel Per Carrier) radio receiver.

In addition to cataloging the foreign language broadcasts currently available, the satellites on which they are to be found, and the equipment required for their reception, I will play some video and audio clips that illustrate the remarkable diversity in content and sophistication of such programs.

The presentation concludes with a discussion of the possible implications of such innovations as Direct Broadcast Satellite (DBS) and Digicipher compression technology for the spread of foreign language programming.

PRESENTER'S BIODATA

Donald A. Becker is Professor of German and Linguistics at the University of Wisconsin-Madison, where he has taught since receiving his Ph.D. in linguistics at the University of Texas at Austin in 1967. His publications deal with German dialectology, the history of the German language, Hindi-Urdu phonology and lexicography, phonological theory, CAI, and the computerization of South Asian scripts. An avid programmer for over 14 years, he authored several programs for the IBM PC that print South Asian languages (Hindi, Urdu, Telugu, and Punjabi) from romanized text files before turning his main attention to the Macintosh and **HyperCard**.

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SENTENCE COMPLEXITY AND ELECTRONIC TEXT TYPE

ROSS BENDER

Computer mediated communication constitutes a vast uncharted territory whose frontiers are rapidly receding. The formidable project of mapping this new space necessitates a consideration of classification schemes: of genre, register, or text type. As new ways are found to communicate via computer, and as texts both classical and modern become available in an electronic medium, new norms and styles of communication are being created, and more and more texts become amenable to processing by machines. While the proliferation of genres — computer conferencing, bulletin boards, discussion lists, electronic mail, IRC, MUDs, and MOOs — can be bewildering, the multiplication of electronic texts provides the opportunity for quantitative assessment such as has never existed before. Mapping this new space is a project spanning traditional disciplines such as literature, linguistics and rhetoric, and such newly minted disciplines as computational linguistics, humanities computing, and applied linguistics.

In a 1991 article in *Written Communication*, Ferrara, Brunner, and Whittemore employ the category of register in constructing their definition of "interactive written discourse." This is an attempt to label one point on the electronic discourse spectrum, namely "the written language occurring in simultaneous terminal-to-terminal typed dialogues." In their experiment the corpus was composed of the computer transactions between 23 subjects and a computer assisted human who answered questions about travel plans. They concluded that 1) interactive written discourse is a naturally occurring register; 2) that it is a hybrid, displaying both written and oral characteristics; and 3) that usage norms are in process of development.

Denise Murray, in her 1991 study of electronic messaging among colleagues at IBM, points out the inconsistency with which such terms as "genre," "channel," "medium," and "mode" are used across and within disciplines. She notes that "mode," "genre," and "style" are also often used interchangeably. Her approach is to offer a very tight definition of medium (in her study the subjects use four media: face-to-face, telephone, computer terminal, and print) and to use "mode" in preference to genre. She defines mode as "specific communication types within a medium, such types being socioculturally defined" and uses it in preference to genre, because of the latter's literary connotations.

Douglas Biber, in commenting on his series of studies using the multidimensional approach to genre variation, notes that he has used "genre" or "register" in cases where text varieties are easily recognized and named in a culture — "letters, press editorials, sermons, conversation." However, he uses the term "text type" for varieties which are defined more quantitatively in the sense that "all share frequent use of the same set of co-occurring linguistic features" (Biber 1993).

John Swales approaches the problem of genre from the discipline of applied linguistics. The aim of his 1990 study, *Genre Analysis*, is to aid in the teaching of academic and research English to speakers of other languages. His definition of genre, quoted in part here, speaks to issues of purpose, content, structure, and audience:

> A genre comprises a class of communicative events, the members of which share some set of communicative purposes. These purposes are recognized by the expert members of the parent discourse community, and thereby constitute the rationale for the genre. This rationale shapes the schematic structure of the discourse and influences and constrains choice of content and style...In addition to purpose, exemplars of a genre exhibit various patterns of similarity in terms of structure, style, content and intended audience.

As should be evident, the attempt to define genre is an ongoing enterprise, and the attempt to extend the notion of genre, or at least of classification, to the field of electronic communication is also an active pursuit. The present study does not propose to solve this problem, but to take a step in that direction using a purely quantitative and one-dimensional approach. I choose the label "text type" essentially because of its quantitative connotation. In this study, however, I do not attempt to map linguistic categories. The approach is to use a measure of sentence complexity to scan a broad landscape of electronic text, to define points on a continuum, and to demarcate some general boundaries.

One definition of sentence complexity was proposed in 1989 by M. A. K. Halliday in his *Spoken and Written Language*. He posits that written language is characterized by "lexical density" and spoken language by "grammatical intricacy." He makes the distinction between lexical items, or content words, and grammatical items. The ratio of lexical to grammatical words in a sentence produces a measure of lexical density: if there are 12 lexical and 8 grammatical items in a 20 word sentence, then the lexical density is 60%. Written language is characterized by a higher lexical density. But, says Halliday, that does not mean that speech is simpler than writing. Speech is "grammatically intricate," so that it too is complex, but in a different way than writing. Speech contains a higher ratio of grammatical to lexical items.

In his *Variation Across Speech and Writing*, Biber uses the terms "speaking," "oral," "literate," and "writing" to make a more complex map of the distance between speech and writing. He illustrates this view using the four genres of face-to-face conversation, academic lectures, personal letters, and academic expository prose. Conversation represents "a spoken genre with highly oral situational characteristics"; academic prose is writing with highly literate characteristics. Academic lectures are a spoken genre with literate aspects, while personal letters are a written genre with oral characteristics (Biber 1988).

Thus the immediate context for the present study is the recent linguistic investigation of the relationship between speech and writing in non-computer mediated texts, and the suggestion by Ferrara et al. that one type of computer mediated communication exhibits characteristics of both spoken and written language. The general context is the attempt to define genre.

I have gathered fifty samples of electronic text; electronic here means simply that they were available online and thus subject to analysis by computer. The samples include text available from Project Gutenberg and the Oxford Text archive (*Genesis*, *The Book of Mormon*, prose by Charles Dickens, Joseph Conrad, Mark Twain, Stephen Crane, H. G. Wells); magazines available from America Online (*Time*, *The New Republic*, *The Atlantic Monthly*) and online journals (*Ctheory*, *Electronic Journal of Virtual Culture*); newspaper and academic prose from Corpus A and B of *MicroConcord*; logs of e-mail discussion lists, available from the list servers; logs of a weekly seminar (*Tuesday Cafe*) on the MediaMOO; the Switchboard corpus of transcribed telephone conversations, the ATIS pilot corpus, radio broadcast transcriptions, and text of the *Wall Street Journal*, all from the Linguistic Data Consortium and made available by Jack Godfrey; transcripts of synchronous conferences by native and nonnative speakers on **Aspects** conferencing software, made available by Julian Linnell; and high school examination essays and essays by ESL students at the Hong Kong University of Science and Technology, made available by John Milton.

The computer program **Readability** offers a purely quantitative measure of sentence complexity. The program scans an electronic text and classifies each sentence on a nine-point continuum from simple to complex. The classification is a result of the word count per sentence, and the ratio of such factors as long words (seven characters or more) to short words, consecutive short word runs to long word runs, and the number of long words per sentence to the length of the sentence. From the percentage of sentences of each of the nine types, a composite index can be calculated which is shown in Table 1 as "Complexity Index."

Precedents for such a purely quantitative approach to genre in corpora can be found in studies of both the *Brown* (Kucera and Francis 1967) and the *London-Oslo-Bergen* (Johansson and Hofland 1989) corpora. In each case the mean length of sentence for each section, or genre, of the corpus was computed. Marckworth and Bell (1967) found a range of mean sentence length from 25.4863 words per sentence in miscellaneous government and institutional documents to 12.7639 in mystery and detective fiction in the *Brown* corpus. Johansson and Hofland (1989) found a range of mean sentence length from 28 for the miscellaneous documents genre to 12 for mystery, detective, and science fiction.

In Table 1, the Mean Length of Sentence is given for each sample. The correlation between the Complexity Index and the Mean Length of Sentence is quite high, namely .80. It will be noted that the range (10-49) is much more extreme than for the *Brown/LOB* corpora; a preliminary guess is that this may have to do with the comparative mechanics of counting words per sentence.

Filename	Index	MSL	# of Words
AspectNN	188	10	16,186
Switchbd	217	13	166,765
ATIS	239	11	15,067
ESLwkshp	244	14	11,960
Kinglear	249	15	27,807
RmusicL	253	13	73,051
Tcafemoo	265	13	71,522
AspectNS	273	15	9,837
Romeo	283	17	25,947
Macbeth	285	15	18,301
Xmscarol	293	19	36,395
Hamlet	298	17	32,246
Alice	306	18	28,750
Timemach	317	17	34,421
ESLessay	319	16	20,841
GenesisN	321	20	41,034
Lordjim	330	19	142,895
Redbadge	337	17	62,171
WordsL	337	31	24,325
ESLhk13	47	17	20,421
DiabeteL	351	19	28,402
Warwrlds	358	20	64,497
AnglicnL	359	18	77,253
Ctheory	359	15	15,961
Caesar	367	19	25,684
Yankee	392	26	124,331
Atlantic	398	19	38,233
Snark	411	25	5,477
HcivwarL	415	20	46,469
Time	419	19	60,236
DerridaL	423	21	55,390
ESLhk2	440	19	25,144
MCBart	449	25	204,613
TeslL	450	22	19,069
Radio	456	21	10,029
GenesisK	461	34	47,889
LactacdL	463	16	34,780
Wallstj	464	22	105,770
Newrepub	482	22	13,876
Mormon	518	39	298,256
Ejvc	526	23	28,055
MCAspo	537	43	189,504
MCBmed	542	28	205,832
MCBsci	545	28	222,616
MCAhom	560	49	218,005
MCAart	567	33	219,302
MCAfor	569	38	216,435
MCBbel	578	30	202,129
MCBsoc	593	34	184,706
MCAbus	595	49	164,750

Table 1. Complexity Index and Mean Sentence Length

In examining Table 1, perhaps the most striking fact is that the Switchboard corpus (the 166,765 words studied here actually represent only a small portion of the whole), which comprises transcriptions of recorded telephone dialogues, done under experimental conditions with a prompt as to topic, falls almost at the low end of the spectrum, while the corpora of academic prose and the *Independent* newspaper texts occupy the opposite end. This confirms the intuitive notion that speech and expository prose represent two ends of a spectrum.

The synchronous computer mediated discussions (AspectNN, ATIS, Tcafemoo, AspectNS) cluster at the "spoken" end of the spectrum, thus confirming Ferrara et al.'s characterization of "interactive written discourse" as both written and oral. In fact, the results of this study demonstrate that such discourse is much closer to the oral end of the spectrum and has much more in common with speech than with writing.

It is interesting that almost all the selections of Shakespearean drama also cluster at this end. This suggests that the dialogue of the plays is in fact reflective of speech.

Text Type	Mean Complexity Index	Range
Speech	217	NA
Synchronous Conferencing	241	188-273 (85)
Shakespearean Plays	296	249-367 (118)
Fiction	333	293-392 (99)
Magazines	433	398-482 (84)
Academic Prose	541	449-593 (144)
Newspaper Texts	549	464-595 (131)
ESL Student Essays	337	244-440 (196)
Asynchronous Conferencing (e-mail)	381	253-463 (210)

Table 2. Text Type and Range

Table 2 displays the text types which suggest themselves as groupings from the data in Table 1. Not all of the 50 samples lend themselves to such discrete classification: e.g., the radio broadcast transcripts, the two electronic journals, *Ctheory* and *EJVC*, and *The Hunting of the Snark*, the only poetry sample.

Most significantly, the eight samples of e-mail discussion lists, asynchronous conferencing on the network, are widely distributed across the complexity spectrum. They do not seem, at least in this preliminary study, to constitute a text-type of their own but rather display a wide variation. Similarly, the four samples of ESL student writing are quite varied.

Thus while this preliminary survey confirms that synchronous conferencing is close to speech in terms of sentence complexity, it opens the question of how asynchronous electronic conferencing can be approached in terms of text type. While it demonstrates that sentence complexity is a useful index in classifying certain forms of electronic text, it opens questions of its utility in exploring the new genres in which ESL students are beginning to write. At the same time, it poses new opportunities for analyzing and evaluating writing produced by learners of second languages.

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CTHEORY, Vol. 16: 1, 2.1, 2.2, 2.3 CTHEORY@VM1.MCGILL.CA

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–DerridaL "A discussion of Jacques Derrida and Deconstruction," DERRIDA@CFRVM.BITNET, (1-8/93).

–DiabetsL "International Research Project on Diabetes," DIABETES@IRLEARN.BITNET, (1-9/93).

–HcivwarL "Civil War History discussion list," H-CIVWAR@UICVM.BITNET, (1-5/93).

–LactacdL "Lactic Acid Bacteria Forum," LACTACID@SEARN.BITNET, (1-9/93).

–RmusicL "Music Discussion List," RMUSIC-L@GITVM1.BITNET, (1/93).

–TeslL "Teaching English as a Second Language discussion list," TESL-L@CUNYVM.CUNY.EDU, (1/93).

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PRESENTER'S BIODATA

Ross Bender received the Ph.D. in premodern Japanese history from Columbia University (1980) and an M.S.Ed. in TESOL from the University of Pennsylvania (1991). He is a Language Specialist in the English Language Programs, University of Pennsylvania. He presented a paper on computerized style-checking at CALICO '92 in Monterey. This year he contributed a review of the **Aspects** conference writing program to the *CALICO Journal*.

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Speech Recognition in Language Education

Jared Bernstein

ABSTRACT

Speech recognition performance improved significantly during the 1980s, opening the possibility of new applications in language education. The paper explains the value and limits of automated voice interaction with reference to the components of language competence and to alternative modes of instructional interaction. Some basic concepts of speech recognition are reviewed and related to the task requirements of a speech recognition system in voice-interactive computer assisted language instruction. The presentation describes three systems that use speech recognition in language education. One system presents a monolingual (Spanish) content-based exercise for second language instruction. The second system scores the pronunciation of non-native speakers of English who call in over the telephone network and read a set of ten sentences. This system is calibrated for middle school children, and it performs its grading function nearly as well as expert human judges. The third system, a voice-interactive reading trainer, can provide practice in (or assessment of) reading skills to adults or children. The presentation explains the operation and design of these systems.

INTRODUCTION

Current methods for language instruction with a teacher and with a computer can be compared with computer based methods that offer a voice-interactive capability using automatic speech recognition. First, certain aspects of live instruction are presented and analyzed. Second, current computer based instructional systems are described and these are contrasted with voice-interactive computer systems. Relative costs and advantages are listed. Finally, the paper gives a brief explanation of speech recognition technology as it is used in language education.

LANGUAGE INSTRUCTION

Four components of language competence are reading, writing, listening, and speaking. Each of these competence components has aspects of skill that range from subtle-conceptual, through conventionally linguistic, to mechanical. For example, in reading, recognizing the political slant of a text is a subtle-conceptual skill, recognizing the proper attachment of a clause is a linguistic skill, and recognizing the characters themselves (e.g. the Japanese kanji) is a mechanical skill. Similarly, in speaking, responding appropriately to a rude question is a subtle-conceptual skill, using the right forms of address with their verbs is a linguistic skill, and pronouncing the words like a native is a mechanical skill.

In general, those skills closer to the subtle-conceptual end of the continuum of skills will require a native or near-native human teacher for some time to come, because many of the subtle aspects of language are still not understood or codified. Even some basic aspects of standard English syntax are not yet well described, and certainly not understood well enough to be programmed into a computer. A computer can teach and test mechanical skills, but it also can present material that exemplifies some subtleties, and check a student's recognition of them.

Live Instruction

The Tutor — A skilled, native tutor who has access to good multimedia materials and who can give individual attention to a student should be the best method for teaching a language. If the tutor is energetic and encouraging and has a fine sense of the subtle aspects of the language, the situation should be ideal. Individual teaching can be sensitive and flexible. The only issues that remain are the cost, availability, and patience of the tutor. These limits on cost and availability, however, lead to the common practice of having classes with several students (or dozens) per teacher and having students exposed to several different teachers during an instructional cycle.

The Classroom – For listening to good examples of language spoken in a meaningful context, the classroom is nearly as good as the tutor. But for practice of productive skills like writing or speaking, the teacher can only spot-check student work as a task rotates around the room or check student work "off-line" when time allows. If the students speak in unison in class, the teacher can focus on one at a time, or can have the students take turns with an exercise. For written work, it is more common that the students write one day and get feedback the next day. This feedback can be over the range of subtle, linguistic and mechanical skills, but it will be delayed. With more than one student, the teacher is still limited to one-at-a-time serial processing. On the other hand, for the time being, only a teacher, like a tutor, can ask open ended questions and deal appropriately with unpredictable answers. Machines are still generally limited to interactive formats that take an fixed-type response.

Computer Aided Language Instruction (CALI) Presentation

Computer aided language instruction (CALI) can support a very rich presentation of material to students – video, speech, singing, images of handwriting, animation, maps, periodical layouts, graphs, and printed text. From the student, on the other hand, most computers only accept mouse and keyboard input. In a typical format, the student sees a video episode or an animated interaction, and then either hears or sees questions that are based on the previously viewed material. The appropriate response is often indicated by typing a word or phase at the keyboard, or by selecting one answer from among several presented. Thus, for contextualized practice in passive skills like listening and reading, current CALI systems should be nearly as good as visiting the country, except that the student cannot participate in what is seen on the video. The student still has the potential advantage over classroom presentation, however, of viewing and reacting to the video at an individual pace.

Access

An important advantage of CALI systems is that students can, in principal, get to the machine any time of day or night, and the computer (if designed right) should always seem patient and willing to work at the student's level and pace. A good computer based language instruction system can also provide teachers with access to continuous, accurate information about student activity and performance. The student, too, can have immediate feedback from the computer about whether or not answers are right. In general, one can assume that computer based instruction is much less expensive per unit time than a teacher.

Voice Interactive Computer Assisted Language Instruction (VI-CALI)

A voice interactive CALI (VI-CALI) system is a specific type of computer based language instruction system that listens to a student and responds differentially to what the student says. A VI-CALI system has all the advantages of any computer based system — rich presentation of material, flexible access, quantitative feedback, and patient adaptation to the student's level and pace. Beyond these features, it offers active practice in the communicative use of the spoken language.

While current-generation computer based systems are limited in the range and modality of student activity, VI-CALI systems open up the possibility that the student can engage in a dialogue in the target language, and practice spoken expression of meaningful material in an interactive context. The student has to speak in response to material he has seen or heard in order to find out more and progress to the next stage of the situation. This communicative use of language is essentially different from repeating material "into the void" as happens with traditional language labs and with some computer based systems. First, there is additional motivation because "someone's listening," and second, what the student says and how he says it influences the course and pace of the succeeding interaction.

Comparative Analysis

In sum, a skilled tutor with substantial resource material is a nearly ideal teacher. Two problems with tutors are solved with VI-CALI systems: 1) the high cost and limited availability of the tutor; and 2) the patience and energy of the tutor for working on the more mechanical aspects of speaking, reading, and listening. (Intelligent pen-input systems would be required to tutor the mechanics of handwriting.) Voice interactive simulations of common interactions like hotel registration or ticket purchase can build communicative skills that are not part of conventional CALI. Students can build confidence that when they speak they will be understood. This experience, which develops and deepens with prac-

tice, can now be gained with a VI-CALI system. Further, the VI-CALI system can keep statistics to inform teachers how much the system has been used, how successful the student has been with it, and let the teacher listen to selected examples of the student's spoken productions recorded during VI-CALI sessions.

Question: What does VI-CALI offer that cannot be done another way?

Answer: Continuous, intensive, monitored practice in speaking, without a teacher.

Question: Is there appropriate content material for our students?

Answer: Speech recognition provides tools; teachers decide content and write lessons.

Question: Does VI-CALI allow teachers to use class time more effectively?

Answer: More of the mechanical skills are taught and practiced individually outside class.

Question: Can a VI-CALI system identify student speaking problems and alert the teacher?

Answer: Yes; and it can record and save student utterances that show a particular problem.

Voice interactive CALI systems can be built to have all the advantages of the best CALI systems, but the VI-CALI system can also build and monitor skills in speech production and pronunciation, unlike a conventional CALI system. While the subtle aspects of language use will continue to require the human touch that only a teacher can give, a VI-CALI system can be compared to a classroom teacher as follows for speech production and pronunciation:

Teacher in Class

- Open, flexible dialogue practice
- Presents good examples
- Pays attention to students in turn
- Integrated, qualitative skill assessment

VI-CALI System

- Constrained dialogue practice
- Presents good examples
- Gives continuous individual attention
- Diagnostic, quantitative skill assessment

Use of voice interactive technology can free teachers to do what teachers do best — engage and motivate students in open dialogue, while monitoring and teaching the deep and subtle genius of a new language.

SPEECH RECOGNITION

Voice-interactive computer assisted language instruction requires the availability of system functions that can recognize what has been said and how well it was said. These functions and their limits are explained below. Instructional use of these functions can be controlled through a lesson editor. The uses of speech recognition in language education are determined, in part, by the characteristics of the technology itself. This section explains how speech recognition works in language education, although teachers and lesson designers do not need to be familiar with the internal details of a speech recognition system.

The Logic of Speech Recognition

In general, when a person interacts with a teacher in a spoken language, there are many aspects of the person's speech that provide information about the person's level of skill in the language. For example, when presented with a question, can the person give a correct answer? How well is the answer pronounced? This section discusses what it means to align an incoming signal with linguistic models and how to score pronunciation.

Recent high performance speech recognition systems, like HTK from Entropic (Young, 1993) or SRI's Decipher system (Cohen et al., 1990), are based on a technique called "hidden Markov modeling" (HMM). This technique assumes that words are composed of sequences of linguistic segments (like "phonemes") and that each segment can be represented by a simple statistical model. Thus, in a sentence like "Sam went in," there are three words, and the words have three, four, and two segments, respectively. Each segment, for example the /m/ in "Sam," is represented as a probability distribution which reflects the likelihood that various spectral shapes will be observed when that particular segment is pronounced.

The shape of the frequency spectrum is different for different sounds: an /s/ usually has much more energy higher in the frequency spectrum, and an

/m/ usually has little high-frequency energy but more low-frequency energy. Thus, the HMM system represents the /m/ as very likely to be observed with frequency spectra that have predominantly low-frequency energy, while the HMM system will expect to observe spectra with more high-frequency energy when an /s/ is spoken.

An implementation of an HMM speech recognition system for language education is shown schematically in Figure 1. There are three primary processing modules that operate in series: a spectrum analyzer, a search-aligner, and a scorer. The search-aligner is the core process that decides (at any given position in the dialogue grammar) which of the permitted utterances was spoken and locates the words and segments in the utterance. To accomplish this, the search-aligner makes reference to the dialogue grammar, the lexicon of the language, and to the segment models. The dialogue grammar controls the lesson.

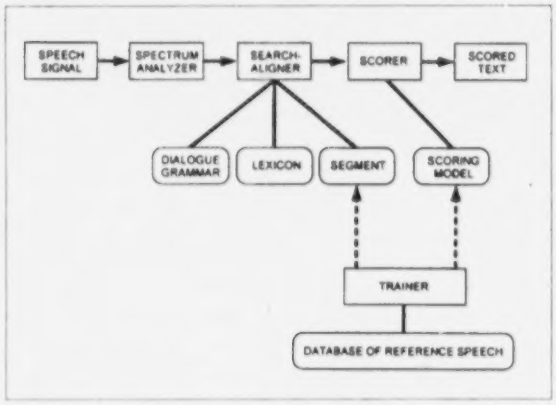

Figure 1.

In particular, the dialogue grammar specifies what sentences are expected or permitted at any particular point in the exchange between the student and the machine. It tells the search-aligner what to look for, for example: check the next incoming utterance to find out which, if any, of a specified set of sentences was spoken. The sentences in the dialogue grammar are listed in ordinary spellings, so the search aligner needs to check the lexicon to find the pronunciation of the words. The pronunciations of the words are listed in the lexicon as sequences of segments, and for each possible segment type, there is a segment model that stores the likelihood of various spectral shapes given that a particular segment type (e.g. /m/) was spoken.

The search-aligner takes a sequence of spectra as input from the spectrum analyzer and selects the one word-string hypothesis which best accounts for the spectra. If the system is asked to pick which one of two sentences (e.g. "In went Sam" and "Sam went in") was said, the system calculates how likely this particular sequence of spectra would be on the hypothesis of a segment sequence {s a m w e n t i n} and on the alternative hypothesis of a segment sequence {i n w e n t s a m}.

The trainer is shown near the bottom of Figure 1. The trainer builds segment models by processing a large database of spoken material. The trainer uses actual pronunciations of the segments in the language to estimate the segment models and the scoring models that are referred to during the search-aligner and scorer processes. The trainer is a development tool that is used in the design and preparation of the speech recognition system; it has already done its work before the first student ever speaks to the system.

There are some allowances that need to be made for the pronunciation of nonnatives, but the calculation of relative likelihood for competing utterances that are possible according to the dialogue grammar is the basic method that answers the first question: What answer did the person give? One more calculation needs to be added to the method in order for the machine to interact with the student in a reasonable way: the system needs to reject spoken utterances that are not even close in form to any of the answers anticipated by the dialogue grammar. There needs to be a rejection threshold such that if the incoming utterance from the student is a very unlikely match to all the available response sentences, the system can take it out of the discourse stream and still prompt and listen for the next contextually meaningful response.

Pronunciation Scoring

The challenge that remains is to score the pronunciation of the utterance. A particular utterance may be much more likely to be an instance of the word string "Uruguay esta al sur de Brasil" than it is to be "Argentina esta al este de Uruguay," yet the utterance may not be well pronounced at all. If it is too far off the mark, it will be rejected, but even if it is above the threshold of rejection, there may be quite a range of pronunciations. What are the methods for determining how well an utterance was produced?

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Fundamentally, the method for scoring pronunciation is to align the speech and then score the various words and segments. For each active sentence, the recognizer search produces two things: a likelihood score for that sentence and an alignment of the words and segments to the sequence of spectra. If the system can find the relevant events in the signal, it remains to score the prosodic and segmental aspects of the utterance. For details of an early method, see Bernstein, et al. (1990).

Training Prosodic and Segmental Scorers

HMM-based speech recognition systems are developed with reference to large bodies of recorded speech material that are used to train the segment models so that they accurately represent the distribution of spectral shapes observed in real speech. A similar process is needed to develop the scoring function. A set of special-purpose algorithms calculates scores for various aspects of the speech signals in a database of nonnative productions. To validate a scoring method, the same database of nonnative utterances is played to appropriate experts who score the pronunciation on one or more criteria. These human-generated scores can then be compared by correlation to the scores that were generated automatically. When the automatic scoring is in close agreement with expert human scores for appropriate samples of spoken material that have not been part of the "training set" of the scoring algorithms, the scoring is deemed valid.

Authoring Lessons and Tests

Instructors who want to use a VI-CALI system in teaching a language need not understand the details of speech recognition development. However, an understanding of the general principles of the recognition and scoring process may be helpful in anticipating the strengths and limits of this technology in language education. After the speech system developer has set up an authoring environment and trained the system on a well-designed database of spoken material, an instructor should be able to use the system to generate teaching materials by writing scripts in a lesson editor that will translate the teacher's flow plan into a sequence of instructions that can be interpreted by the dialogue grammar. The editor program then translates the teacher's lesson plan into a format that resides in the dialogue grammar module of the VI-CALI. This lesson plan then controls the sequence of materials displayed by the system and defines what sentences are expected to be spoken by the student.

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PRESENTER'S BIODATA

Jared Bernstein has designed several systems that use speech recognition in language instruction and assessment. During 1992, Bernstein led the development of a commercial system that automatically grades the pronunciation of non-native English.

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THE FOREIGN LANGUAGE TROUBLESHOOTERS WITH ACTIONMEDIA II, OS/2 FULL-MOTION VIDEO

JAY F. BODINE

ABSTRACT

The **Foreign Language TroubleShooters** is a template authoring system allowing easy computerization of language exercise. Coupled with the full-motion video capabilities of Intel/IBM's **ActionMedia II** hardware and software under OS/2, the program allows a comparatively easy production of sophisticated exercises based upon quarter-screen digitized video.

Principles of authoring a meaningful exercise underlie the appropriate use of technology to allow actual improvements in language learning. Effective exercises based upon a video clip could well entail students' verification (of multimedia content), personalization, contradiction, anticipation, reprise, and hypotheses.

Basically, what you need to do to create an exercise with the **Foreign Language TroubleShooters** is to type in appropriate questions and their correct answers along with the name of the audio-video segment you record or produce with Intel/IBM's **ActionMedia II**.

With the **ActionMedia II** program you record or produce an video segment from a VCR or other analogue source. The **ActionMedia II** program digitizes and compresses the segment for storage on a hard disk (9 MB per minute of video). Upon replay, the segment is presented over a VGA (or SVGA) monitor and a speaker system. With current token-ring, and with future LAN technology, it is possible to have one copy of the program on a file server furnish the program and exercises to numerous client or student-exercise machines on a LAN. You can easily adapt specific exercises to your students' needs and make them readily available over the network. Digitized data is also ready to transfer to a CD-ROM disc.

The **TroubleShooters** program currently incorporates code from the **ActionMedia II** Toolkit allowing it to play the video segments, then cues the problems or questions the author of the exercise has based upon the video clip, then compares students responses to the correct answers (according to word order and characters, particularly accents and umlauts, etc.) and then guides the student to correct those aspects of his/her answer that are wrong. Student scores are collected and recorded for homework grading.

PRESENTER'S BIODATA

Jay F. Bodine, Associate Professor of German at Colorado State University, also taught at Southern Illinois University, the University of Kentucky, Princeton University, Trenton State College, and is the principal author of the **Foreign Language TroubleShooters**, computerized exercises which have been published for twelve text books (French, German, Italian, and Spanish); DOS, Windows, OS/2, and Macintosh.

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TRANSPARENT LANGUAGE: COMPUTER TECHNOLOGY COMFORTABLY ALIGNED WITH LITERARY TRANSLATION

ROBIN ORR BODKIN

ABSTRACT

What better author with whom to learn and appreciate through a computerized presentation the captivating beauty of the French Language than Prosper Mérimée (1803-1870)! Not only did Mérimée begin his literary career as a translator keenly attuned to the complexities and subtleties of learning another language (after studying Latin and Greek in high school along with English and Italian at home, he began work on a translation of *Ossian* at the age of 17 with Jean-Jacques Ampére, the son of the famous scientist Andre-Marie Ampére; later he would learn Russian eventually rendering into French for the first time Puskin, Gogol, and Turgenev) but the narrative innovation of his mature writing, particularly with respect to the short story and novella, distinguishes him as one of the founding fathers of the modern novel. In short, if Gustave Flaubert's prescription against the emotional and lyrical excesses of nineteenth-century French Romanticism (*nu lyrisme, pas de réflexions, la personnalité de l'auteur absente* — no lyricism, no reflections, the personality of the author must be absent) has become the artistic compass with which most of the writers of French fiction down to our own era have navigated, then certainly Prosper Mérimée stands out as one of the most influential precursors to this development.

Computer assisted language instruction is the future here and now. The true beauty of presenting these texts in the Transparent Language format is first and foremost a thorough grammatical and lexical analysis of all important French terms. Heretofore, reading a foreign language classic at the beginning, intermediate, and even advanced levels has required patiently juggling the original along with a dictionary and a grammar. Now the necessary explanations have been customized for each text as well as its components and can be accessed on demand. But more importantly and beyond the cultural and historical commentary provided, the literal or word for word rendering is vividly juxtaposed on the **Transparent Language** screen with phase translation, if and when the text necessitates it, that prioritizes the reading sequence and compels the reader to begin to appreciate intimately (which is not often anticipated at this very early stage) the nuance and richness that literature — a highly stylized language — brings to the learning experience.

This presentation will not only demonstrate and discuss the Transparent Language program itself but offer several direct applications for beginning, intermediate, and advanced *cours de langue* as well as translation courses.

PRESENTER'S BIODATA

Robin Orr Bodkin has been a fellow (1991-94) at the College International des Traducteurs Littéraires in Arles, France as well as having taught in the USA at all levels, including institutions ranging from the community college system to Columbia University. For the past five years he has been exploring with an ever-increasing interest (as well as developing) computer assisted learning tools.

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A NATURAL LANGUAGE FRONT-END TO DATABASES

IGOR BOGUSLAVSKY AND LEONID TSINMAN

ABSTRACT

The Laboratory of Computational Linguistics of the Institute for Information Transmission Problems of the Russian Academy of Sciences has developed a multipurpose multilingual linguistic processor (ETAP-3) designed to handle natural language texts. The linguistic processor can be viewed as a software system able to understand and produce natural language texts, i.e. to emulate the language competence and performance of a human being. The ETAP-3 system has two modules: a bidirectional system of high quality machine translation and a natural language front-end to databases. The machine translation module operates between English and Russian and translates texts in the subject domain of electrical engineering and computer science. The front-end provides a non-professional user with an effective means to address a database in virtually unrestricted natural language (Russian or English). It translates queries to relational databases into standard SQL expressions using full morphological, syntactic and semantic analysis. The front-end can also be asked to paraphrase the query in order to make certain that it was properly understood. The system is implemented on a MicroVax 3100 computer running under a VMS operating system. All programs are written in C.

INTRODUCTION

In 1989, a group of researchers at the Institute for Information Transmission Problems of the Russian Academy of Sciences, including the authors of the present report, began the elaboration of a major research project of computer text processing. Currently, the project, called ETAP-3, consists of two large modules, closely related to each other: a bidirectional system of machine translation and a natural language front-end to databases. Both modules, implemented on a MicroVax-3100 computer, have two working languages: Russian and English.

Theoretically, this project is based on a very general linguistic approach, the so-called Meaning – Text theory, in which natural language is viewed as a universal mapping mechanism between any text produced by man and the meaning rendered by the text. This approach was originally suggested by Igor A. Mel'chuk (1974, 1987) and later elaborated lexicographically by Jurij D. Apresjan (1980, 1986, 1992) into the theory of integral description of language.

In the implementation of this theory, the authors proceeded from a number of general principles. The most important of them is the principle of independence of the form in which all linguistic knowledge is presented with respect to the language described, the subject domains, the algorithms of text processing, and the specific task solved by the system. As a result, the authors were able to develop a multipurpose and multilingual computer system of language processing which can, in case of need, accept new working languages, new subject domains, and be extended to new tasks.

GENERAL LAYOUT

In both modules, processing is performed in a number of steps, each corresponding to a specific level of linguistic representation. The major steps of machine translation include:

- morphological analysis, which receives a natural language sentence and transforms it into a sequence of so-called morphological representations of words;
- syntactic analysis, or parsing, which processes the output object of the previous step and constructs a syntactic structure of the sentence (a dependency tree composed of words of the input sentence as nodes and labels for syntactic dependency relations as arcs; we use from 40 to 60 dependency relations for such languages as English and Russian);

- deep syntactic analysis, which transforms the obtained syntactic structure of the source sentence into a normalized structure – some sort of a deep syntactic structure specially adapted to subsequent processing;
- transfer (translation proper), which replaces the normalized structure of the source sentence by a normalized structure for the target sentence, translating all language elements (lexical units, grammatical features and names of syntactic relations);
- deep syntactic synthesis, which transforms the normalized structure for the target sentence into a surface syntactic structure;
- surface syntactic synthesis, which transforms the dependency tree into a linear sequence of morphological representations of words of the target sentence, using rules of grammatical agreement and syntactic government and supplying all nodes of the dependency tree with missing morphological features; and
- morphological synthesis, which transforms morphological representations of words into real wordforms, thus generating the target sentence in conventional spelling.

For the front-end, one more level of processing is needed – that of semantic analysis (see below).

THE NATURAL LANGUAGE FRONT-END TO DATABASES

The objective of this module of the system (Boguslavsky and Tsinman 1989, 1990, 1992) is to process natural language queries to computer databases in order to facilitate the access to the databases for a wide range of non-professional users. Natural language front-ends have serious advantages over alternative means of database access, such as menus, icons, or key words. Non-professional users usually do not have the time or motivation to endure more than a few minutes of instruction. Even if they learn special commands or a special query language, the need to have access to the database may be so infrequent that they will forget them. This category of users may need to represent complex, ad hoc commands or questions which cannot be processed in a convenient way by menu or icon systems.

The front-end receives at the input a query, written in free natural language with practically no restrictions on its syntax, and translates it into an intermediary semantic language and then into the formal query language SQL (Structured Query Language), directly accessible by most of the database management systems.

This task is very similar to that of machine translation systems, with the only difference that the translation is being performed into an artificial and not into a natural language. However, this difference is important enough as to make it necessary to add another, deeper level of sentence representation and, respectively, an extra phase of system operation.

The point is that, in translating from one language into another (no matter if it is natural or artificial), the depth of analysis is determined by the measure of the structural gap between the languages in question. Most of the European languages are so similar in their structure that we need not go further than the level of the deep syntactic structure in the process of translating between them. The situation is quite different with the front-end. The discrepancy between a natural language and the SQL is obviously so great that to overcome it we simply must get down to the next – semantic – level of sentence representation.

The degree of this discrepancy can be easily seen if we compare a natural language query with its SQL representation: e.g., the query, "Which analysts working in Chicago get the maximum salary in their departments?" will receive the following SQL translation:

```
SELECT   ENAME
FROM     EM T, DP
WHERE    JOB = 'analyst' AND LOC = 'Chicago'
         AND T.DEPTNO = DP.DEPTNO
         AND SAL =   (SELECT   MAX (SAL)
                     FROM      EM
                     WHERE     DEPTNO = T.DEPTNO)
```

Formally, the semantic structure is the same kind of object as the syntactic structure, i.e. the dependency tree, but it is designed with an entirely different purpose.

The syntactic structure has its face turned to the natural language. It represents the syntactic composition of a concrete natural language sentence. It aims to reflect what English or Russian words are employed in the sentence and how they are linked with each other.

In contrast to this, the semantic structure is domain-oriented. It is insensitive to the way the original sentence was made up and even to the natural language it was written in. The important thing for the semantic structure is the subject domain which it is meant to describe, i.e. the elementary objects occurring in it and the relations between these objects.

As an illustration, we shall give two examples of English queries and their SQL representations produced by the front-end. The only difference between the queries is the syntactic function of one proper noun, which nonetheless results in drastic differences in their semantic structures and corresponding SQL queries.

In which department does manager Johnson work?

```
SELECT   DEPTNO
FROM     DP A
WHERE    (A.DEPTNO IN
         (SELECT   DEPTNO
         FROM      EM B
         WHERE     (B.JOB = 'manager' AND
                   B.ENAME = 'Johnson')))
```

In which department does Johnson's manager work?

```
SELECT   DEPTNO
FROM     DP A
WHERE    (A.DEPTNO IN
         (SELECT   DEPTNO
         FROM      EM B
         WHERE     (B.DEPTNO IN
                   (SELECT   DEPTNO
                   FROM      EM D
                   WHERE     (D.ENAME = 'Johnson')))
                             AND (B.JOB = 'manager')))
```

THE GENERATION OPTION OF THE FRONT-END

As mentioned above, the front-end is designed to facilitate the access to databases for non-professional users. Users of this type are not supposed either to "speak" SQL, or to understand it. For this reason, they are not in a position to verify the front-end output. It is highly desirable to provide them with such an opportunity if only because natural language queries, as any natural language expressions, can be ambiguous, to say nothing of the possibility that the front-end may simply make a mistake. To meet this need, a special option of the front-end has been developed which gets at the input the semantic structure of a query and generates a natural language question which has the same meaning as the initial query but is logically more explicit. Should the user agree that this question correctly represents his or her information need, the semantic structure which served as the input for the generation will be transformed into the SQL representation. Otherwise, the user may ask the system to produce an alternative interpretation of initial query, or else he may suggest another formulation of the query.

The generation option is developed so far only for the Russian input of the front-end. Here are, in English translation, some examples of the queries together with the output of the generation procedure.

- Who is the manager of Jones? What are the names of the employees who work in the department in which Jones works and who occupy the position of managers?
- In which departments do the employees earning the highest salary work? Which are the numbers of departments in which the employees work who have a salary which is equal to the maximum salary of employees?
- List the employees whose bosses earn a salary less than 3000 dollars. What are the names of the employees such that the employees who are their bosses earn less than 3,000 dollars?

ARRANGEMENT OF ETAP-3 RULES

One of the main features of the ETAP-3 system is the fact that all its components have a logically transparent, natural, and economic organization. All sets of rules employed in both modules of the system are arranged in three subgroups depending on their degree of universality: general rules, specific rules (rules of limited application), and dictionary rules.

General rules, which describe general linguistic regularities, are activated in processing every sentence, while the other two types are only resorted to if the processed sentence includes words whose lexical entries (in the source or the target combinatory dictionary) contain a direct reference to these rules (type 2) or the rules themselves (type 3).

ETAP-3 MODULARITY

A major advantage of the system is its high extent of modularity. Though the linguistics of ETAP-3 is composed of a dozen of components (morphological dictionaries of English and Russian and algorithms for the morphological analysis and synthesis for the two languages; combinatory dictionaries of English

and Russian; parsing rules (so-called syntagms) for English and Russian; transfer rules for English and Russian; rules for semantic analysis and generation (necessary for the front-end only), rules for the syntactic synthesis of English and Russian sentences), its four largest components – the morphological and the combinatory dictionaries of English and Russian – are designed in such a way as to be used in both modules of the system and in both directions of translation. This was done in order to avoid unnecessary duplication of information. In English-to-Russian translation, the English dictionaries serve for the morphological analysis and parsing, while the Russian dictionaries are used for the syntactic and morphological synthesis. In the Russian-to-English option of translation the roles of the dictionaries are swapped.

It is to be noted that the front-end makes direct use of a large part of the machine translation module components. In particular, the two modules have the same morphological analyzers and parsers. Although the front-end has its own combinatory dictionary, a large share of the information present in dictionary items is the same as in the machine translation module. The normalization component of the front-end has much in common with the respective component of the machine translation module, although their tasks are somewhat different. However, the front-end module has two entirely new components which have no counterpart in the machine translation system: a set of semantic rules, designed to translate the syntactic structure of the source sentence into the semantic structure, and a semantic dictionary whose items contain special semantic units, which the semantic rules resort to. In a sense, the semantic dictionary is similar to the target dictionary of the machine translation module in that its units can be viewed as translational equivalents for words of the natural language.

Originally, the only working language for the front-end was Russian. Later on, means were found to supplement it with English using part of the machine translation module. In this latter option, the front-end starts with the query in English, "half-translates" it, with the help of the English-to-Russian option of the machine translation module, into a Russian deep syntactic structure, and proceeds as stated above.

It should be stressed that all mathematical, logical, and software support of the system is absolutely the same for both modules of the system. When the work begins, the operator only needs to specify the desired option.

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PRESENTER'S BIODATA

Igor M. Boguslavsky graduated from Moscow State University in 1972, Ph.D. in Computational Linguistics and Russian from the same university in 1979. From 1985 until present, he has been employed at the Institute for Information Transmission Problems, Russian Academy of Sciences (Moscow), and currently as the Head of the Computational Linguistics Laboratory. Dr. Boguslavsky's fields of research include human-computer interface, machine translation, formal models of language, semantics, and lexicography. He is also a member of the Advisory Committee of the European Chapter of the Association for Computational Linguistics.

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CALL FOR THE ECLECTIC LANGUAGE TEACHER, OR THE CAMEL'S NOSE APPROACH

CLAIRE BRADIN

ABSTRACT

Even though a great deal of CALL software is now available, we continue to hear from our colleagues, "there's nothing out there," or "this isn't what I want." Rather than dismissing them as technophobes who are behind the times, we might better develop strategies to facilitate their involvement in CALL by considering their criticisms seriously and providing them with smaller, flexible modules which may more readily reflect what they do want.

In this paper, the presenter briefly outlines some of the reasons that some commercially available CALL software may not be readily adopted by foreign language educators. The paper stresses the advantages of supplying a variety of templates/lesson types which address different approaches to language teaching. A procedure is recommended for gradually introducing these small computer based activities and modules in the curriculum.

Specific suggestions for CALL activities are offered and some of the techniques, exercises, and templates developed by the presenter are demonstrated. This humble approach may seem less impressive at the beginning but may yield more effective long-term results as faculty become actively engaged in CALL.

PRESENTER'S BIODATA

Claire Bradin has been committed to computer assisted language learning (CALL) for the last 10 years. She is a doctoral student at Michigan State University, where she serves as CALL coordinator at the English Language Center.

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ASSESSING STUDENTS' USE OF FEEDBACK STRATEGIES

KLAUS BRANDL

ABSTRACT

This presentation describes the methodology and results of a research study analyzing students' use of feedback in computer assisted language learning.

The purpose of this study was to examine high (HA) and low (LA) achievement learners' strategic responses to errors in computer assisted language learning. Twenty U.S. college students who were enrolled in a third semester German class, ten of whom were identified as high, and ten as low achievers, did a computerized exercise transforming 12 sentences from active to passive voice. Each group worked with a different set of 12 sentences, six of which were considered easy for that group and six difficult. Of the 12 sentences, six sentences overlapped and six were different. The six overlapping sentences constituted difficult sentences for the LA group and easy sentences for the HA group. The subjects were asked to use any of the four feedback options to check their mistakes. These options were:

- feedback only stating "right" or "wrong",
- feedback only marking the error,
- feedback providing grammatical hints related to the source of the error, and
- correct answer feedback.

The students' choices, answers, and error collections were recorded on a running log sheet. Additionally, subjects were interviewed afterwards to allow them to explain their reasoning processes in their error connections and to comment on them.

The low achievers used all four feedback options significantly more often then the high achievers. All subjects chose option 1 most often, then options 2, 3, and 4 in that order. The HA students showed a stronger tendency than the LA students to select those strategies that allowed them to figure out the correct answers themselves, asking for as little help as possible. The strategy use changed for both groups as the material became more difficult. HA students preferred to explore the source of their errors, while the LA students looked up the correct answers more often. The student's self-reported data confirmed their strategic behavior, thus suggesting that, during a learning task, HA students engage more in the learning process exploring a variety of linguistic and semantic information to make the activity meaningful, whereas LA students, by not engaging to the same degree, are ultimately not as successful in the learning process.

PRESENTER'S BIODATA

Klaus Brandl (Ph.D., University of Texas at Austin) is the Language Pedagogy Specialist at the University of Washington, Seattle, where he teaches courses in applied linguistics and language teaching methodology. He is the author of several computer programs such as **The German Passive Voice Tutor**, **The German Pronunciation Tutor** and the **LET'S TALK** Series published by the HyperGlot Company.

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STORY TELLING AND NEW TECHNOLOGIES: NEW WAYS TO LEARN LANGUAGES

MICHAEL D. BUSH

ABSTRACT

Recent work by cognitive psychologists is showing the powerful relationship between stories (or experiences) and mental processes. Moreover, many language instructors are interested in the notion of "comprehensible input" but wrestle with the impracticality of dealing with this concept in classes the size one finds in today's typical foreign language classrooms.

New technologies (interactive videodisc and compact disc-based, full motion video systems) are opening up new horizons of language learning by facilitating the combination of the powerful concept of stories and comprehensible input. It is becoming increasingly possible and affordable to create new language-learning experiences for individuals either in a learning center configuration or for stand-alone, individualized learning settings.

This presentation shows examples of how these new technologies are being used in various language learning settings around the world. Demonstration of both interactive videodisc and compact disc technologies will be provided. The speaker also discusses issues of implementation, some pedagogical as well as others that are practical.

PRESENTER'S BIODATA

Michael D. Bush, involved in programming different computers in various ways and using them to solve diverse problems over the past 25 years, has a very wide range of experience in the uses of high technology in education. Since his retirement from the U.S. Air Force in August 1992, Professor Bush has been serving as Associate Professor of French and Instructional Science at Brigham Young University in Provo, Utah.

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Implementing Multimedia Events in Interactive Video Lessons

James Champion

ABSTRACT

Authoring programs for interactive video lessons are designed to facilitate the implementation of various multimedia events in teaching materials. In **Libra**, an authoring environment for multimedia lessons on the Macintosh, this process is straightforward and is based on the concept of linking one event to another. The "triggering" event may be clicking on a button or on hyperactive text, or the opening or closing of a card or stack. The event which is linked to may be the opening of a card in the same stack or in a different stack, different types of dialog boxes or prompts, various multimedia events, as well as any combination of different events.

The presenter discusses and demonstrates a number of these multimedia events as they are implemented in **Libra**. These events include picture files (black and white and color), digitized audio (voice and music), video (both CAV and CLV discs), and **QuickTime** movies. Advantages and disadvantages of each are discussed, as well as related questions of availability, appropriateness, acceptability, and memory demands.

PRESENTER'S BIODATA

James Champion is Professor of Spanish and Linguistics at Southwest Texas State University. His current research interests include computer applications in Spanish linguistics and IAV.

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Theoretical Bases for Human-Computer Interaction Research in CALL

Carol A. Chapelle

ABSTRACT

Research investigating human-computer interaction (HCI) can provide some of the evidence needed to understand how learners work with CALL activities. Through this research, however, it is apparent that technical capabilities for HCI data collection in CALL exceed researchers' theoretical and analytic capabilities for interpreting HCI data. This paper suggests how theory in applied linguistics can inform the design and interpretation of HCI research in CALL. In particular, it outlines theory pertaining to the following questions:

- What inferences can be drawn from HCI data?
- What types of HCI data can provide evidence about second language acquisition in CALL contexts?
- How can the study of HCI data improve the design and use of CALL?

The relevant theory draws from interactionalist perspectives of language ability (Bachman 1990) and development (Long 1985) as well as a systemic linguistic perspective of language use in context (Halliday 1977).

WHAT ARE HCI DATA?

Research on HCI in CALL can investigate a wide variety of pedagogical and psycholinguistic questions about second language acquisition (Chapelle, Jamieson and Park 1994). In pedagogically-motivated HCI research, the question is whether learners' software use appears to have instructional benefits. Psycholinguistically-motivated CALL research, consistent with the objectives of second language acquisition (SLA) research, uses CALL environments to collect data pertaining to learners' developing language and strategies. Regardless of the wide variety of aims of HCI research, the data observed in CALL environments consist of only two basic types: the behaviors learners exhibit during the process of their work and their linguistic products.

One type of behavior learners exhibit is each choice they make while they are working. In most CALL environments, learners are presented with some sort of a linguistic or communicative challenge which they are expected to work through with the help of the available resources, which may include dictionaries, and grammar help, as well as audio and video segments (Chapelle and Mizuno 1989). In some CALL contexts, learners might also make choices about the linguistic or communicative challenges they should work on. A second type of data is the duration of learners' activities, measured either by the amount of time they spend working on a segment or the number of exchanges they engage in. For example, the researcher might record the duration of time the learner spends between the time a question is posed and the time a response is entered (Jamieson and Chapelle 1987). Duration can also be measured as the number of exchanges the learner engages in (Hsu, Chapelle and Thompson 1993). A third type of behavior that can be observed is learners' editing — making changes in their linguistic output (Jamieson and Chapelle 1987).

The linguistic product data that can be observed is learners' written or spoken input to the computer. For example, in a study of students' use of an on-line dictionary, Bland, Noblitt, Armington, and Gay (1990) observed the linguistic characteristics of students' queries (words and phrases) to an on-line dictionary. Other linguistic data that can be obtained are constructed responses to CALL activities (e.g., Garrett 1982) or entire texts written using word processors or instructional programs.

Whenever learners work in a CALL environment, they produce both behavioral and linguistic data, which combine to form a type of text exhibiting both process and product characteristics of language use in context (Martin 1985). From the perspective of applied linguistics, a text is "language that is doing some job in some context." It may be "spoken or written, or indeed in any other medium of expression that we like to think of... Text is a form of exchange; and the fundamental form of a text is that of dialogue, of interaction between speakers" (Halliday and Hasan 1989). In HCI research, texts are also comprised of the interaction between humans and computers.

THEORETICAL FOUNDATIONS FOR PERFORMANCE IN CALL CONTEXTS

To make sense of the texts observed in CALL environments, the researcher must work within a theory which hypothesizes the factors affecting observed behavior and language. In other words, the data researchers observe are seldom the objects of interest; instead, researchers are interested in making inferences on the basis of the data. This brings us to the first question: What inferences can be drawn from HCI data? There are a number of theoretical positions which could guide interpretation of HCI data; however, applied linguists who study language performance (Hymes 1972; Canale and Swain 1980), second language acquisition (Ellis 1989; Tarone 1988), and language testing (Bachman 1990) support an "interactionalist" perspective. The clearest statement of this perspective is Bachman's (1990) general interactionalist construct definition of communicative language ability, which "includes both knowledge or competence and the capability for implementing that competence in language use" in context (Bachman 1990). To use an interactionalist perspective, we must theorize the aspects of learners and contexts which are responsible for HCI data.

The primary **learner factors** relevant to performance in CALL contexts (in addition to world knowledge) are the components of *communicative language ability*, which is comprised of language knowledge, fundamental processes, and metacognitive strategies (Bachman 1990). Language knowledge refers to knowledge of vocabulary, syntax, rhetorical organization, illocutionary functions and sociolinguistic conventions, for example. Learners' linguistic knowledge is inferred by their linguistic products in many different contexts including CALL activities. Fundamental processes refer to the cognitive processes required for accessing linguistic knowledge. In experimental settings, the amount of time subjects take to respond to a task is often used as an indicator of how automatic subjects' processes are. Metacognitive strategies are the processes learners use to oversee and control their language performance and acquisition. The metacognitive strategies Bachman (1990) defined as strategic competence are assessing the situation, setting goals, planning language use, and controlling execution of plans (Faerch and Kasper 1983); Oxford (1990) presents a longer list of acquisition strategies. A variety of methods have been used to assess metacognitive strategies (Cohen, in press; Faerch and Kasper 1987) including the use of HCI data (e.g., Jamieson and Chapelle 1987).

The **contextual factors** included in an interactionalist definition must fit within a theory of how the context of a particular situation within a broader context of culture constrains the choices a language user can make during communicative performance. Systemic theory provides a general theory to do just that. Halliday and Hasan (1989) present a theory of context comprised of three complex elements: field, tenor, and mode. "Field" includes the topic(s) present in a particular context and the setting in which language is used. "Tenor" includes the participants, their relationships, and objectives. "Mode" includes the channel, texture, and genre of the language used in context. The specific combination of values for field, tenor, and mode — called the *contextual configuration* — influence the nature of the texts produced in HCI research.

These perspectives of communicative language ability and contextual configuration provide a theoretical orientation which the researcher can use to hypothesize the factors underlying performance in many different settings. In CALL settings researchers are interested in identifying particular types of performance data — those hypothesized to have positive consequences for acquisition. This brings us to the second question: What types of HCI data can provide evidence about second language acquisition?

THEORETICAL FOUNDATIONS FOR ASSESSING SECOND LANGUAGE ACQUISITION IN CALL CONTEXTS

The study of texts produced in language learning contexts is important because, as second language classroom researchers (e.g., Long 1980) have pointed out, these texts document instances of language use which are intended to facilitate acquisition of communicative language ability. If researchers investigate the discourse functions in HCI texts, they can make hypotheses on the basis of other SLA research which has investigated the value of particular types of texts for SLA acquisition. SLA researchers have hypothesized the value of three aspects of interactions: 1) the nature of the input to the learner, 2) the learner's interaction with the input, and 3) the output the learner produces.

First, the target language input learners receive is an important source of data for second language acquisition (Krashen 1982) if it is comprehensible but also containing linguistic material new to the learner. In CALL texts, then, we should be concerned with the nature of the computer's input to the student, as Underwood (1984) pointed out. The best way for the researcher to assess whether input is comprehensible for an individual learner is to observe how the learner responds to it.

Second, Long (1985) has hypothesized that the process of interaction with the target language input to make it comprehensible is a key factor in second language acquisition. The learner needs to receive the input, be confused about some aspects of its meaning and therefore request a repetition, clarification, restatement or some other type of modification. "Modification of the interactional structure of conversation or of written discourse during reading ... is a [good] candidate for a necessary (not sufficient) condition for acquisition. The role it plays in negotiation for meaning helps to make input comprehensible while still containing unknown linguistic elements, and, hence, potential intake for acquisition" (Larsen-Freeman and Long 1991). In CALL texts, then, we would like to see learners' moves which request modifications of the input they receive. We would like to see, for example, learners requesting clarifications, restatements, definitions and explanations — all of which are intended to help them understand the meaning of the input they receive.

A third piece of text that is believed to be important for acquisition, particularly acquisition of grammatical competence, is what Swain calls comprehensible output. Because of the numbers and dynamics involved in classroom learning, "comprehensible output is, unfortunately, generally missing in typical classroom settings, language classrooms and immersion classrooms being no exceptions" (Swain 1985). Is comprehensible output present in CALL texts? Texts in which learners initiate or respond by producing language can illustrate production of comprehensible output. Again, the value of the comprehensible output is observed in a sequence of text in this case consisting of the learner's unsuccessful attempt to express something, the other participant's communication of misunderstanding, and the learner's correction.

This work hypothesizing the features of texts for acquisition provides clear directions for CALL research. By investigating the extent to which HCI texts display these positive features, researchers can begin to find evidence for positive CALL contexts.

THEORETICAL FOUNDATIONS FOR IMPROVING CALL CONTEXTS

To use HCI research for improving CALL contexts, researchers need to understand the connections between the observed texts and features of CALL contexts. This brings us to the third question: How can the study of HCI data improve the design and use of CALL? CALL designers and users want to know what they are doing to yield good interactions so they can keep doing it and they want to know what they are doing to inhibit good interactions so they can stop doing that.

To address the question of how contexts are related to texts, we need to return to Halliday and Hasan's theory of context because it provides the framework needed to hypothesize such connections. For example, Berry (1987) has worked on this problem by identifying differences in texts produced within similar contextual configurations (i.e., two participant dialogs) and then attempting to specify the elements of the contextual configurations associated with differences in the texts. In the case she studied, the solution was to attribute the differences among the texts to differences in the roles of the participants within the dialogs (i.e., one element of tenor).

If researchers were to attempt a similar approach to the problem of connecting HCI texts to contextual configurations, they would find many terms referring to the "role" of the computer in CALL. What they will not find is insight into the connection between "roles" and the nature of the texts produced in the particular CALL context (Chapelle 1990). Such connections can be made only through the study of actual HCI texts produced in CALL contexts. The actual HCI texts provide evidence for the quality of CALL contexts for the language acquisition experiences of individual learners, and therefore are essential for understanding computer "roles" and other aspects of CALL contexts.

RESEARCH DIRECTIONS

The combination of theoretical perspectives drawn from interactionalist theory of communicative language ability and development as well as a systemic linguistic theory of context provide both the necessary foundations for interpretation of HCI data and the direction for future HCI research. The inferences drawn from HCI data should pertain to the components of communicative language ability and contextual configuration hypothesized to underlie performance in context. The HCI data that currently provide the best evidence about SLA are those which display the types of interaction hypothesized by SLA researchers to facilitate acquisition. Identifying such interactions — and others hypothesized to be beneficial — should be a primary research objective in HCI studies. The study of HCI data can improve the design and use of CALL if positive features of interaction can be related to elements of CALL contexts so designers and users can construct future CALL contexts with similar positive features.

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Carol Chapelle, Associate Professor of English at Iowa State University, has published research on human-computer interaction in journals such as *TESOL Quarterly, System,* and *Language Learning.*

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Visual Interface Design in a Multimedia Program to Improve Reading Skills

Dorothy M. Chun and Cheryl Cardoza

ABSTRACT

Research on the nature of learning in general suggests that the human mind does not work as a serial processor but rather operates by association.

This presentation discusses the visual interface design of a multimedia program, **CyberBuch**, whose primary instructional goal is to improve the comprehension skills of students who are beginning to read authentic German texts. The metaphor of a library provides the user with a familiar environment, and, after selecting a text to read, users see a "preview" in the form of a **QuickTime** movie which serves as an advance organizer to convey global information about the text and to activate top-down processing strategies or associations. Students then see the text and can access information on unknown words in the form of hypermedia links, such as graphics, video, and sound, by clicking on a word, dragging it, and dropping it on any of the media links. By avoiding translating, glossing, and purely textual explanations, learners are encouraged to infer the meaning of a word or phrase, and, by using multiple or integrated types of information, can thus formulate their own cognitive schemata. In other words, they "make their own connections" rather than having connections made for them (or in this case, having translations given to them).

The interactive nature of the program allows learners to choose the type of information or media link that is most helpful to them. In addition, a guided-writing exercise in the form of a "notebook" is used to check comprehension. The program was pilot-tested with 40 second-year German students at the University of California, Santa Barbara. User reaction to the visual interface design and ease of use was overwhelmingly positive; in addition, users found the multiple media links very beneficial for learning new vocabulary words and understanding the text.

PRESENTER'S BIODATA

Dorothy M. Chun (Ph.D., UC, Berkeley) is Assistant Professor and German Language Coordinator at UC, Santa Barbara. She has published in *CALICO Journal*, *Foreign Language Annals*, and *System*.

Cheryl Cardoza (M.A., Purdue) is a Ph.D. candidate in English Literature at UC, Santa Barbara. Her main interests lie in multimedia and its pedagogical possibilities; she has developed several **HyperCard** stacks, including one for **CyberBuch**.

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PROVIDING USEFUL FEEDBACK IN INTERACTIVE AUDIO EXERCISES

DAN M. CHURCH

ABSTRACT

One of the distinct advantages of CALL is the immediate feedback provided to help students understand and learn from their mistakes. On the other hand, one of the distinct disadvantages of traditional tape-based language laboratory work has been the absence of such feedback. The use of digitized sound in CALL lessons can eliminate this traditional shortcoming of audio lessons. However, certain elements inherent in good audio practice call for some modification of the principles that are normally followed in creating CALL feedback. Interactive audio exercises are focused primarily on aural comprehension tasks and should provide students with appropriate feedback to reduce frustration without undermining the pedagogical goals.

Are there ways of helping students understand difficult utterances without just giving them the written text of the utterance? How can feedback (as well as the questions themselves) prompt selective listening? How should the program deal with the student who still does not understand after multiple tries?

I will discuss the principles to be followed in creating (or evaluating) such exercises and demonstrate how feedback that seems to border on artificial intelligence can be accomplished using the facilities of **WinCALIS**. The examples shown will involve various types of interactive audio exercises, from pure aural comprehension to grammatical exercises calling for student production of the written language based on sound cues. All examples will be in French, but the principles involved apply to other foreign languages.

PRESENTER'S BIODATA

Dan M. Church is Associate Professor of French and Director of the Language Laboratory at Vanderbilt University, former chair of the Courseware Development SIG, and former member of the CALICO Advisory Board. He has written two series of interactive audio exercises for elementary French, one based on the textbook *C'est à dire* and accompanying tapes and the other based on *Premiers Exchanges* and accompanying tapes.

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USER INTERFACES AND MULTIPLE ACTIVITIES: THE USER PERSPECTIVE

LORENZO CIONI

ABSTRACT

People usually act on the basis of concurrent activities. Whenever a computing system comes into play, there is need to map on it such activities. Computers, indeed, work on the basis of programs and there is hardly a one-to-one correspondence between an activity and a built-in program. Consequently, computing systems need to be supplied with some tool that supports the establishing of the correct connections among programs to allow the development of an activity.

Moreover, people interleave their activities and often perform them on a step by step basis. Interleaving results either because of long lasting activities or because an activity may consist of a set of concurrent tasks with real time demands. Therefore, users need a support to decompose an activity on the existing programs through the definition of a set of cooperating programs called a working set that can be created, destroyed, saved, or stored as needed so to allow either the suspension or the resumption of an activity of task. This requires the introduction of the concept of context as the actual status of a task, its subtasks, and its correlated tasks together with any shared data. Suspension needs the saving of proper context. In this presentation, window systems and menu based user interfaces are examined within this perspective. The thesis is that they support multiple processes far better than multiple activities. This implies the need to enrich such environments so to help users in carrying out their activities easier. Besides support for easy suspension, reminding, and resumption, the environments, therefore, need to be supplied with tools for the definition and management of contexts as integral elements of a user interface.

PRESENTER'S BIODATA

Lorenzo Cioni is a technician working at the Laboratorio di Linguistica of the Scuola Normale Superiore in Pisa. His interests center on software development for speech processing and user interfaces, analysis, and design.

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CREATING MULTILINGUAL TEMPLATES FOR INTERACTIVE CD-ROM

SAMUEL D. CIORAN

ABSTRACT

The presentation will begin with a background description of the objectives, methodology, and pedagogical philosophy underlying the development of the integrated multimedia materials for **Russian Alive!** and **Welcome to Divnograd!** Attention will then be focused on the specific role of the interactive CD-ROM running under **Windows** and Asymetrix's **Toolbook** on the IBM PC.

I will demonstrate how students can access the recorded biographical information on twenty fictional Russian characters living in the fictionalized city of Divnograd in order to learn about their social backgrounds, their work habits, their tastes in clothing, food, and recreation, and, finally, a description of a typical day in their lives. After hearing the characters talk about themselves, students will be able to test their knowledge of the social-biographical information provided by each character through a series of visual and audio questions.

Then, I will discuss how the framework which was created for these Russian biographies can be readily utilized for similar cultural linguistic activities in other languages, including ESL, French, German, Spanish, and Italian.

Finally, I will demonstrate the feature-length video film *The General's Daughter* which has just been filmed in Russia using characters and information drawn from the CD-ROM program and **Welcome to Divnograd!** in order to discuss how that material will be made available in a computerized version under **QuickTime**.

ACKNOWLEDGMENT

The author would like to recognize Joanna M. Johnson for her contribution to this work.

PRESENTER'S BIODATA

Samuel D. Cioran, Director of Humanities Computing Center and Professor of Modern Languages (McMaster University, Canada). Author of **Russian Alive!** and **Welcome to Divnograd!** Co-developer with Joanna M. Johnson of **mcDRILLmaster** (Holt, Rinehart and Winston) and **mcBOOKmaster** (Prentice Hall), authoring language systems for the IBM PC.

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USING DIGITAL VIDEO TO ENHANCE HUMAN-COMPUTER INTERACTION IN CALL

K. BERND CONRAD

ABSTRACT

QuickTime and **Video-for-Windows** present two software standards for digital video that have major implications for courseware development in computer assisted language learning. The technology has opened new avenues of documentation, annotation, and illustration of content in language learning software. More importantly, digital video has the potential for raising the level of interaction between the human learner and the computer medium. The goal of my presentation is to outline and document this potential.

My presentation will focus on the progressive use of digital video along four succinct stages: delivery of contents, exploration of source materials, evaluation of learner response, and composition of contents by the learner. Each of these four stages represents an increasing level of interaction that is uniquely facilitated by the technology in question.

While at stage one, contents are merely presented. Learner involvement is heightened by the seamless integration and dynamic display of text and video, a feat that cannot be accomplished by print-based or linear media. At stage two, learners explore video-based materials and "consult" video clips via simple access controls such as play/stop/step/reverse, or perform certain tasks (e.g., comparison of features, object, or event identifications). At stage three, learners interact directly with the video window to obtain immediate performance or response feedback. At stage four, digital video becomes an innovative tool used by learners to create forms of visually supported and referenced compositions.

The majority of examples for each level of interaction will come from the presenters multimedia rendition of the exhibit "Degenerate Art: The Fate of the Avant-Garde in Nazi Germany" that is currently under development. A brief overview of digital video technology for newcomers will be provided at the beginning.

PRESENTER'S BIODATA

K. Bernd Conrad is Director of the Language Learning Center and Assistant Professor of German at Northern Arizona University in Flagstaff, Arizona. He earned his Ph.D. in Applied Linguistics at the University of Texas. His publications and presentations have been on course design and CALL. In addition to the '90, '91, '92, '93 and '94 CALICO symposia, he has presented at national and international meetings. Dr. Conrad's CALL specialization is the development of interactive multimedia materials.

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THE LABORATORY, THE SOFTWARE, THE STUDENTS, AND THE INSTRUCTORS

MARIA COOKS

ABSTRACT

The present paper will explore how the ergonomics of Computer Instructional Laboratories affects students and instructors. It will also explore the relationship that software designers should have with the instructors, lab technicians, and course coordinators.

INSTRUCTIONAL LABORATORY DESIGN AND OPERATION

During the design stage of a computer lab, a number of factors need to be taken into consideration. While planned instructional activities for the lab determine the design, it is often a product of compromise physically and financially. In the first stages of the design of an instructional laboratory, one tends to anticipate the needs of the particular instruction to be carried out in those labs. It is only after they have been used for a semester or more that one is able to assess the real needs and actual usage of the lab. It is then of paramount importance to have an ongoing dialogue among all the persons involved in order to anticipate and shape the future needs of Computerized Language Instruction. Many times unforeseen student behavior requires a change in the physical set up of the labs, or even in the general hardware to avoid unwanted conduct. In Foreign Languages Instruction we found that a monitor in front of each student got in the way when the instructor needed to monitor the activity or have the attention of the whole class for explanations. These problems were taken care of by moving those classes to a computer lab where the layout was sideways (computers facing the side wall) providing better supervision by the instructor, or by providing a switch for the instructor to turn off the students monitors.

For these problems to be taken care off in an efficient way, one needs to have a central organization in control of all computer lab facilities on campus able to implement changes in future computer labs. This was one rationale for having the central computing center at Purdue in charge of all computer facilities on campus.

HISTORY: A PLAN

In the late 1980s, the central administration of Purdue University initiated a five year plan designed to significantly increase the amount of microcomputers and workstations available for use in undergraduate instruction. This plan, with the approval of all the Deans, was designed to spend upwards of a million dollars a year to create, maintain, and administer 3-5 new labs a year during the tenure of the program. In order to tap much needed resources required to implement this plan and bring about an economy of scale, it was decided that the University's central computing center (PUCC) would be in charge of the logistical support for the project.

Each of the schools would be targeted at least twice during the five years. The number of years each school would be targeted and the amount of money allocated to them would be based upon the size and perceived need of the school. In the planning stages for those years, thae Dean would have the opportunity to recommend where the money would be spent within his/her school. Usually this was based upon the recommendations of their department heads.

CREATION OF A LAB

Typically a need had already been demonstrated by faculty who had made use of existing facilities. These designs were thus driven by the instructional needs of the very faculty who would use the facility upon

completion. Once a targeted group or working committee was selected from within each school, PUCC would work with them to maximize the functionality of the lab using the dollars at hand. The selection of the platform is typically based upon the what the targeted students will see after they enter the work force, e.g. a lab for graphics artists will be based upon Macintoshes. Some examples of targeted audiences, and the design features they naturally created are:

Targeted Group	Laboratory Design Feature
Technical Graphics or Interior Design	Enough horse power and screen resolution to properly teach the intended CADD concepts
Programming Courses for Engineers	Unix workstation, similar to what they'd see *out in the field*
Foreign Language and Creative Arts	Special station design to allow for the diversity of equipment needed at each station, e.g. headphones, graphics tablets, midi, etc.
Professional Writing programs of Calculus classes that stress team problem solving.	Use a room layout that's designed in clusters of stations, rather than the typical rows of a lecture hall.

The Instructional Lab initiative provides money from central funds for the following:

- Any physical renovation needed to the room.
- Facilities equipment, e.g. tables, chairs, cabinets, white boards, screens, etc.
- Connection to the campus network/backbone.
- Computers for each station in the configuration needed for that lab.
- Related computer equipment such as printers, scanners, videodisk players.
- Software: OS, network, and a basic/standard suite of applications.

For a professional writing lab, this standard suite would include word processing, desktop publishing, and page layout software; whereas for technical graphics, a standard suite might consist of CADD software and a spreadsheet package.

We are able to steer the labs towards some measure of uniformity by offering to provide word processing package A or B out of program funds. But if you really like or need package C, we will be glad to install it for you if you are willing to buy it. Since our labs are geared towards teaching concepts to undergraduates, A and B (typically the industry favorites) are fortunately more than adequate.

In our Instructional Lab model, the targeted school or department is expected to provide:

- Courses designed to make use of the lab as soon as it has been completed.
- Staffing for discipline specific open hours (outside of scheduled class time).
- Software that is discipline specific.

For example, a lab targeted towards Restaurant and Hotel Management would make available the most popular industry software for a reservation or meal menuing system.

SOME CURRENT STATISTICS

All labs have Ethernet connectivity to the campus backbone network. Through the campus backbone, all lab machines connect to a set of file and print servers using network software based upon TCP/IP and NFS protocols.

The **DOS/Windows** and Macintosh labs are connected to 2 IBM RS/6000 servers running IBM's AIX operating system. These two machines currently support 310 Macintoshes and 380 **DOS/Windows** machines in 36 labs, found in 28 different locations scattered across the central campus and the undergraduate residence halls.

The SUN labs are connected to two SUN 4/690 SPARCservers, running the most recent non-Solarus version of SUN OS. These two servers currently support almost 200 SUN IPCs in 15 labs, found in one central campus building and each of the undergraduate residence halls.

Using these servers, we are able to provide centralized lab management, file distribution and a certain amount of uniformity from one lab to the next. These allow for a more efficient use of computing center staff and excellent flexibility in class scheduling. These servers also enable us to provide centralized file storage space for students, accessible from any lab. Faculty with the appropriate network connectivity can administer their own files on the servers and access student files turned in for grading.

ONGOING SUPPORT

PUCC provides logistical support for the day-to-day operation of the labs by providing a structure to offer assistance in the following ways:

A. Problem reporting and troubleshooting

(1) Full-time staff respond to engineering problems and repair requests
  (a) Loss of network connectivity
  (b) Computer hardware is not functioning properly
  (c) Some aspect of the physical facilities is dysfunctional.
(2) Full-time staff respond to software problems
  (a) Computer will not even start up properly
  (b) Software applications are not configured properly or will crash
  (c) Network connectivity is erratic or down

B. Lab Administration

(1) A PUCC Lab Coordinator for each lab
  (a) Typically a graduate student fromthe targeted school or department
  (b) Acts as a liaison between PUCC and the instructors using the lab
  (c) Provides instruction on use of the lab as needed.
  (d) Post signs, schedules, and other relevant information
  (e) Helps in reporting and follow ing up on lab problems
(2) Faculty scheduling a lab for their class(es)
  (a) Through their departmental schedule deputy for Amstar long events
  (b) Through full-time PUCC staff for last minute, non-periodic events
(3) Open lab staffing
  (a) Several labs are staffed by the targeted school or department
  (b) Several labs are staffed by PUCC student consultants
  (c) Some labs have no need for time outside of class and are unstaffed.

C. Response to lab upgrade suggestions

(1) Reconfiguration of existing software.
(2) Improvements to the facilities, such as providing a BARCO projector.
(3) Upgrading the hardware in the lab; computers, printers, networking, etc.

THE SOFTWARE, THE STUDENTS, AND THE INSTRUCTORS

We can also extend the definition of the ergonomics to include the approach to the design process for software. Traditionally, educational software has been the responsibility of either an instructor or programmer. Facilitated by advances in technology, teams of researchers have formed to tackle larger projects. With these teams, each member may take responsibility for a part of the overall project rather than all members working the entire system together. While many research projects may be developed in isolation, educational software at the university level involves not only the designers, students and instructors, but system administrators and lab technicians, who are invariably excluded from the design process.

The strategies of software and engineering design have been studied in depth in the fields of management, industrial engineering, and software engineering. One of the major changes in industry today is the formation of interdepartmental teams which design and develop products together. Dr. Deming who is acknowledged as the innovator behind Japan's manufacturing success, stated that we must "break down the barriers between departments." "People in research, design, sales, and production must work as a team to foresee problems of production or in use." By including more people in the design process who play different roles in the overall implementation of the software, the process can be streamlined reducing the amount of rework and alpha site testing.

To illustrate this concept, we will use our design of "Computer Aided Language Education Tools." This software is now being used for different levels of Spanish at Purdue University and consist of a set of drills involving lexical, semantic, syntactic, and contextual skills. It was designed to provide 1) as much versatility as possible in language skills, to accommodate student needs, 2) simplicity and efficiency in the input and retrieval of data, to accommodate instructor needs.

From day one the consultant in charge of the instructional laboratories was involved in the networking of the software, suggesting efficient and secure ways to best maintain the simplicity and efficacy of the program within the configuration of the computer labs. As problems were reported by instructors relating to student behavior or performance of the software, other administrators, and technicians were involved in this process in order to assess the problem and suggest solutions to it. More and more as the configuration of computer labs changes, there is a need for this kind of interdepartmental cooperation.

Students tend to rise to the challenge of computer instruction by finding ways to outsmart the system. Since some of the drills appeared in their quizzes or exams, a common problem for us was to stop students from printing a copy of the drills. This was accomplished by disabling the "Screen Dump" feature of the Macintosh when using our program.

Instructors meet at the beginning of the semester with computer center personnel for a tour of the instructional labs and a hands-on session on logging in, putting data, retrieving grades, and general protocol of Computerized Instruction. An instructor who has already taught in the computer lab meets the class with the new instructor in the labs the first time around to assure that everything runs smoothly.

The versatility of the program allows the creativity of the instructor to play an important role. Instructors are encouraged to create new drills for every lab session, to individualize them as much as possible, and to discuss with other instructors new formats they would like to see included in the system.

By including not only the language professor and programmer in the design of the software but also network specialists or system administrators, one minimizes problems that may later arise due to lab configurations. At the same time, by observing the interaction of students and instructors with the software, one is able to anticipate what kind of software will future labs need for language instruction

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PRESENTER'S BIODATA

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QUILL: Quick and Easy Video Authoring

Bettina Cothran and Rick Thomas

Georgia Tech has developed an interactive language learning system called **QUILL**, for Quality Interactive Language Learning. **QUILL** enables quick-turnaround authoring of interactive activities which are used as supplements to intensive classroom language training. The project continues to incorporate new methods and new technology on a fast track. Authors quickly incorporate exciting, current video materials into new activities. Using news broadcasts, technical videos, or special productions for instruction, **QUILL** brings the sights and sounds of a country or language into the classroom. Culture-specific mannerisms and interactions are experienced in a realistic context where the student may get a sense of attending a business meeting, asking directions, or applying for a job.

Interest in the topic at hand is probably the single most important factor in a successful learning experience. In teaching a foreign language this requires convincing the students that the subject matter presented is meaningful for their later lives and making the learning process one to which students can and want to relate.

Authentic materials provide not only interesting subject matter developed for a specific (real life) audience in the target language, but also present the language in its true and unadulterated form. Guided by specific exercises which vary in levels of difficulty, the materials should enable students of various proficiency levels to understand the issues. Being confronted early on with authentic materials will ease the learner's understanding of the target language from the very beginning and avoid the unpleasant fact that after years of learning, the first experience with the real life language leaves the learner afloat — or perhaps drowning — in a sea of words and sounds he does not understand. Reading and listening exercises that do not aim at total comprehension but rather familiarize students with certain patterns of sounds and speech that enable them to get the gist of a written or spoken text are useful tools in understanding.

As Claire Brandicourt Saint-Léon writes: many language instructors deplore the non-structured aspect of authentic materials, their lack of conformity with standard grammatical rules, or simply with the order of presentation of the vocabulary in one text or another...as if students could ever hope to find a world that would fit into their book (1988). It is crucial for the language learner to confront the real world as soon as possible.

If a teacher is not a native speaker, it is even more important that s/he uses authentic materials — that is to say, audio tapes, printed material or videotapes — in the classroom. While it is difficult for a student to understand audiotapes because of the lack of visual support, videos, on the other hand, offering more clues for comprehension, are viewed as less frustrating and thus more rewarding by the students. Videos prove to be a powerful tool in the language classroom. If language teachers sometimes seem to resist authentic materials, the language learners, on the other hand, seem to favor them. Brandicourt Saint-Léon notes that the non-didactic nature of commercial programs which are in no way intended to teach the language is what makes them appealing to students because they perceive them as real. The comments of our students who have used **QUILL** interactive videos definitely support this statement. Another advantage is that videos increase the students' motivation. Ingeborg McCoy and David Weible mention that a "number of authors, who described their experiments with video, reported increased student interest" (1983). The combination of moving pictures and sound is highly fascinating. Television attracts the attention in an irresistible way. Moreover, watching TV constitutes a great part of our students' lives. It is — regrettably! — more natural for them to watch TV than it is to

read a book. As early as eleven years ago, McCoy and Weible noted that, "there is no denying the visual orientation of young people today. Television has been with us for over 30 years. Most of our students cannot envision a world without it." (1983)

Video also happens to be the next best thing to actually being in the country of the target language as far as the nonverbal aspects of communication are concerned. Language learning occurs in a culturally authentic context. Gestures, expressions, attitudes, settings, including the way people dress, behave or decorate their home or office become part of the communication matrix, something which is not possible when using a textbook or audiotapes only. Those aspects are not merely icing on the cake, they play a decisive role. According to Ronald Applbaum, 65% to 80% of all our communication is nonverbal (quoted by Galloway, 1980). Recognizing cultural behavior differences becomes indispensable when a student is expected to function well in a foreign country or with foreigners in his own country. A mistake experienced as "cute" from a tourist on the street might not be as easily accepted in a business meeting, for example. Economically and even geographically, the U.S. is no longer as isolated as it once was. International commerce has become the rule rather than the exception. Language instruction has to reflect these changes.

Being able to present videos in our computer assisted activities gives us all the advantages of using videos in the classroom in a traditional setting and even more. At Georgia Tech, we have developed a language program enhancing the major studies of our students who are predominantly enrolled in courses of engineering or international policy and management. To ensure that students can make real progress in their foreign language studies, we have developed a summer intensive program, Languages for Business and Technology (LBAT) which provides approximately 200-250 hours of instruction beyond the basic level. The program is presently available in French, German, and Spanish, with plans to add Japanese. Typically, students entering this program are on the novice or intermediate low proficiency level. After the summer experience, exit exams show that students have made real progress and usually achieve an intermediate high proficiency ranking.

One of the most successful tools for teaching in the summer program — and hopefully soon in the regular program as well — is interactive video. By combining video with the computer we provide students with a learning tool they truly enjoy. As Marianne Phinney points out: "almost every study has reported that students enjoy using a computer to write and that they feel a sense of mastery and accomplishment in learning to use software. Students spend more time writing when they use a computer, apparently because they enjoy it" (1991). We certainly have found this to be true for the students in the LBAT program. We practically have to beg them to leave after the class is over.

One reason why the computer assisted exercises are such a success with the students certainly lies in the fact that they can practice at their own pace and without fear of embarrassment in front of the class or the teacher, repeating a sentence or sequence as often as they wish by simply moving the cursor below the video. At Georgia Tech we have developed software tools which are easy to use and allow us, the teachers and authors, to prepare teaching units using video segments in an extremely short turn around time. We select short segments (typically between 60-180 seconds for one unit, of which 15-20 seconds are chosen for a specific activity) of a video such as a current news broadcast, a technical video, or a business scene. The author starts then with a layout screen on which s/he chooses a sequence of exercises. Currently available are multiple choice, fill-in the blanks, ordering, and essay writing (see appendix), of which the first three are programmed for immediate feedback.

The author locates the activities on one of five proficiency levels. By choosing exercises of various levels of difficulty, one could conceivably use one video segment for exercises on various proficiency levels. The author then develops the exercises much as one would do on paper, with the easy-to-use tools provided by the software, adds one or more video segments (perhaps with arrows to point out features of interest), and adds of course the feedback as a verbal commentary in the target language ("this was not correct, please try again;" or "good job! This is correct!" etc.) as well as a visual clue such as a checkmark or similar device. The software also allows for explanations or clues using a special box on which the student may click if s/he chooses.

Based on the easy to use software, it is possible to develop materials for two or three class sessions from a news video in about two to three hours, with the major portion of the time devoted to considering the exercises, as one would do with any medium.

As authors, we have also discovered that working with interactive video is a lot of fun and actually quite addictive.

For the learner, the use of the software is very easy as well. Starting from the index screen, the learner can click on the exercises in the suggested sequence, but could also work on them in any order s/he wishes. It is also very important that the tools allow the learner to go back to the index or get help. Immediate response as well as a tally at the end of the exercises inform the student of his progress. It takes our students 60-90 minutes to complete one typical interactive unit. As far as content is concerned, the interactive video unit fits within a larger context. In a chapter on, for example, energy sources, we may show a video segment on alternative energy sources. An interactive video session is more productive when preceded by a number of pre-activities and followed by post-activities, such as a written exercise. One or two weeks later the students should be given the opportunity to redo the same unit, possibly without pre- or post-activities, to verify that the material has indeed been mastered.

The advantage of using a computer over a regular textbook is that it can grant the learner a great deal of control on the tasks to be performed and it gives him immediate feedback. It has been pointed out that many software programs rely too much on fill-in-the-blank exercises and multiple choice, resulting in "glorified electronic workbooks" (Chun 1992). What is needed are "more programs which utilize sound and pictures and are contextualized or task-based with a focus on meaning and allow the user to communicate back and forth with the computer." (257-8) Why is the interactive feature so significant? Research shows that individuals have an ability to retain material longer when they participate in the learning process.

Currently with **QUILL**, interactive capabilities include navigation to activities and questions, playing and replaying the video, responding to questions with an answer, asking for help with an answer, playing the pronunciation of a word, asking for clues in fill-in the blank exercises, and asking for summary of work and results.

QUILL tools run on standard Macintosh computers with a minimum of five megabytes. A typical authoring station is based on a Quadra 660av. A typical learner station is based on a Macintosh LCIII. Since digital video involves large files, an Ethernet network is almost essential for loading the classroom.

The **QUILL** design attempts to address several major challenges in language learning with the help of computer and interactive video: creating a meaningful context, providing authentic exposure to the language, using practical short answer activities to stimulate original use of the language, incorporating cultural aspects in the language learning process, and providing useful responses to the learner's written and spoken language.

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NOTE

Much of this information appears also in the article by Catherine Marin and Rick Thomas "Quality Interactive Language Learning at Georgia Tech," *Proceedings of the MacBeth National Conference 'Computing in the Liberal Arts,'* April 1993.

PRESENTERS' BIODATA

Bettina Cothran has been active in the teaching of applied languages, specifically Languages for Business and Technology, for more than 15 years. Since joining the Department of Modern Languages at Georgia Tech in 1990, she has been involved in the new intensive summer program, Languages for Business and Technology. She has developed teaching units for this program using the software created for Georgia Tech's **QUILL** (Quality Interactive Language Learning) laboratory which combines video segments with exercises on the computer screen. Dr. Cothran is also a member and past chair of the AATG's Committee for German in Business and Technology.

Rick Thomas is President of Evenview Corporation, a Macintosh software developer, for which he is the principal technologist. He is a graduate of the Georgia Institute of Technology where he earned both the Bachelor and Master of Electrical Engineering and of Georgia State University where he earned the MBA. He has been working as an engineer and design consultant in the Atlanta area since 1975. Rick specializes in "team communication" by providing multimedia-based communication and training solutions for business and education. Rick maintains an active interest in many fields related to communications and society, including rapid adoption strategies for new telecommunication technology, high-performance teams, and innovations in education and learning.

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APPENDIX

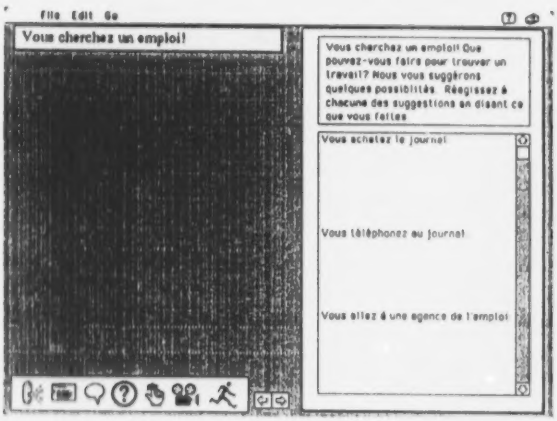
File Edit Go
Vous cherchez un emploi!
Vous cherchez un emploi! Que pouvez-vous faire pour trouver un travail? Nous vous suggérons quelques possibilités. Réagissez à chacune des suggestions en disant ce que vous feriez.
Vous achetez le journal.
Vous téléphonez au journal.
Vous allez à une agence de l'emploi.

Figure 1. Composition Activity

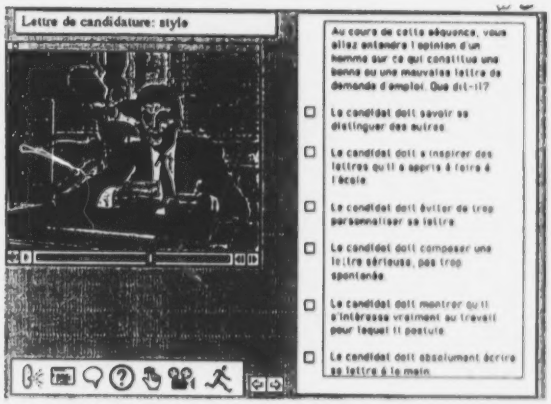
Lettre de candidature: style
Au cours de cette séquence, vous allez entendre l'opinion d'un homme sur ce qui constitue une bonne ou une mauvaise lettre de demande d'emploi. Que dit-il?
Le candidat doit savoir se distinguer des autres.
Le candidat doit s'inspirer des lettres qu'il a appris à faire à l'école.
Le candidat doit éviter de trop personnaliser sa lettre.
Le candidat doit composer une lettre sérieuse, pas trop spontanée.
Le candidat doit montrer qu'il s'intéresse vraiment au travail pour lequel il postule.
Le candidat doit absolument écrire sa lettre à la main.

Figure 2. Multiple Choice Activity

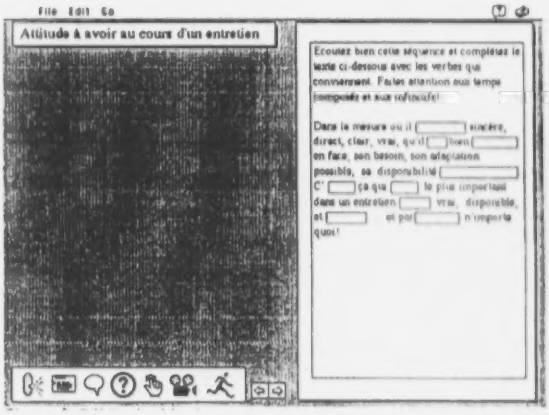
File Edit Go
Attitude à avoir au cours d'un entretien
Ecoutez bien cette séquence et complétez le texte ci-dessous avec les verbes qui conviennent. Faites attention aux temps composés et aux infinitifs!
Dans la mesure où il ( ) sincère, direct, clair, vrai, qu'il ( ) bien ( ) en face, son besoin, son intégration possible, sa disponibilité ( ) C' ( ) ça qui ( ) le plus important dans un entretien ( ) vrai, disponible, et ( ) et par ( ) n'importe quoi!

Figure 3. Fill-in the Blanks Activity

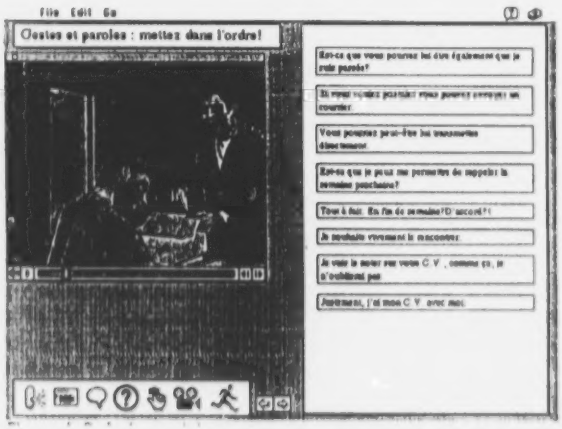
File Edit Go
Gestes et paroles : mettez dans l'ordre!
Est-ce que vous pouvez lui dire également que je vais passer?
Il vous faudra patienter vous pouvez prendre un courrier.
Vous pouvez peut-être les rencontrer directement.
Est-ce que je peux me permettre de rappeler la semaine prochaine?
Tout à fait. En fin de semaine? D'accord?!
Je souhaite vivement la rencontrer.
Je vais le mettre sur votre C.V., comme ça, il s'habituera bien.
Justement, j'ai mon C.V. avec moi.

Figure 4. Ordering Activity

BEST COPY AVAILABLE

UNIVERSITY LEVEL ESL STUDENTS' EXPERIENCES WITH ELECTRONIC JOURNALS

MARY-LOUISE CRAVEN

ABSTRACT

This paper discusses the findings of a six-month research study comparing and contrasting native-speaking and English as a Second Language (ESL) students' experiences with shared electronic journals. These students were part of a large first-year social science course, and while the focus of the course was not on language learning in the traditional CALL sense, findings are applicable to ESL university instructors interested in electronic communication. ESL students might be unfairly disadvantaged in communicating through the electronic medium because of a lack of sociolinguistic knowledge.

General hypotheses about the effectiveness of electronic asynchronous communication involving intermediate level ESL students begin the effort. An outline of the "ad hoc" conferencing set-up follows (given a NeXT environment and no "true" conferencing system). "Electronic journals" and how they fit into conventional ideas about electronic conferencing are then discussed. The data collection included storing six months of weekly journals. From the journals, a taxonomy was devised to describe the kinds of responses the students were making about their peers' journals (there were approximately five students per group). A research assistant coded the journal responses and the author tabulated the results. This year, in the same course, a "true" conferencing system was used running on a networked Macintosh system, and preliminary comments about the effectiveness of structuring online journals via this software will be provided.

PRESENTER'S BIODATA

Mary-Louise Craven teaches in the Division of Social Science and the Department of Languages, Literatures, and Linguistics at York University, Toronto, Ontario, Canada. For many years she has concentrated on teaching university-level ESL students. Her content area is computers and society. She also directs a large Macintosh networked Writing Center. Her dissertation is on issues of literacy in the hypertext and hypermedia world. Her applied research has been on assessing the effectiveness of electronic communication.

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Multimedia in Foreign Language Instruction

Jerry Cronin

ABSTRACT

This presentation focuses on material that was published in the *IALL Journal* of Fall 1993 in which detail on how to prepare multimedia lessons in a cost effective manner was described. The programs that will be demonstrated will be **Kid Pix, Kid Pix Companion,** and **HyperStudio** for the Macintosh. The authentic resource material will come from Scott Foreman's Spanish CD-ROM called *Encuentros a lo vivo, Destinos* — a laserdisc Spanish program from Annenberg, authentic video material from other laserdisc resources, and materials from **Project Orillas** which is a cultural exchange program with students in Puerto Rico.

The presenter is a high school Spanish teacher and has spoken at CALICO previously on the topic of multimedia. *Destinos* provides the foundation for the course, but it is supplemented with authentic foreign language laserdisc material from *Espana Viva, México Vivo, Picasso, Barcelona, Diez Temas,* and *The Random House Spanish Program.*

Students are presented with the video material. Whenever possible, students will simulate a portfolio of their language production from essays, written exams, audiotapes from the Tandberg Language Laboratory, videotapes, and multimedia projects. The students range in age from 13-16 and are primarily freshmen and sophomores in High School. *Destinos* was produced at the University of Illinois for college level students and is used at the U.S. Air Force Academy. The presenter demonstrates how to integrate this material and shows student samples. Scott Foresman selected one of the student programs for inclusion on their CD-ROM.

PRESENTER'S BIODATA

Jerry Cronin is currently a Foreign Language Teacher and Technologist at Glenbrook South High School in Glenview, Illinois where he has been employed for two years. Prior to his move to the Midwest, he was a Spanish Instructor and Department Chairman of Foreign Languages at Arroyo Grande High School in Arroyo Grande, California. He has presented for ACTFL at Glenbrook South High in 1992, CALICO, SWCOLT, CFLTA, and at CUE (Computer Using Educators) in California. He has also presented at MECC in Minnesota on the topic of education in the 90s as well as conferences for Illinois State Educators. He has consulted with the University of Missouri at Kansas City and the University of Denver. He has also published in the *IALL Journal* and collaborated with Scott Foresman on their Spanish CD-ROM. He attended Stanford University and graduated from the University of Oregon with a B.A. in Spanish.

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WHAT WILL THAT ATTRACTIVE SOFTWARE REALLY DO?

WILLARD TICKNOR DAETSCH

ABSTRACT

Some ideas will be presented about the need for standardization in description and evaluation of software. Those attending the session will work through a suggested questionnaire.

Included in the discussion are the following items, not necessarily in the order given: developer, language, level (linguistics level and age level), and purpose of the software.

Other issues to be considered are the following:

- Can teachers/users adapt and add to the program to fit individual needs?
- Is the software geared to a particular text?
- Would the program lend itself easily to added features (e.g., connection to a dictionary, grammar, etc.)?
- What are the special features?
- Is the program interactive?
- Is it an intelligent tutor?
- Can the user get print-outs of material she/he would like to have in hard copy?
- Does it have parsing capability?
- Is the program designed principally for classroom use? Individual study?
- How user-friendly is the program?
- Has the program been beta-tested? Are there things about the program which need further development?
- Does the program allow recovery of student work which could enhance research on language acquisition?
- What is the platform on which it will run?
- What peripherals are needed?
- What about cost?

PRESENTER'S BIODATA

Dr. Willard Ticknor Daetsch, Associate Professor of German and Linguistics at Ithaca College (1965 to date); Dana Fellow and Visiting Faculty at Carnegie Mellon University 1987-89 and 1990-92. Pedagogical interest in the intelligent adaptation of technology to the learning/teaching/research process in all aspects of language, literature, and cultural studies. These interests include use of CD-ROMs, laserdiscs, **QuickTime**, etc. Gesslers is publishing my software which uses the German version of Dik Browne's cartoon **Hagar der Schreckliche** to assist with learning to read German. I have demonstrated this program along with work by Kathryn Murphy-Judy and Chantal Cornuéjols in a presentation called "Advertisements and Cartoons as Avenues to Linguistic and Cultural Understanding" in Japan (FLEAT) and Hungary (CALICO).

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ORTHO-DIDAC: Courseware for Learning French Spelling

Lise Desmarais and Jean-Roch Roy

The teaching of spelling is a constant concern of educators, parents, and leaders in social organizations who see in the mastery of spelling an indication of the individual's general competence. However, performing at a high level is still not demonstrated by a large number of adults in the workplace. For this reason, the development of a teaching strategy appropriate for adult learners is relevant.

The ubiquitous computer is an excellent tool to assist individuals in improving their spelling skills. The use of a spell checker is appropriate since it is a widely used office work tool with many of its capabilities still to be exploited.

BACKGROUND RESEARCH

ORTHO-DIDAC is the outgrowth of a study undertaken to propose and promote a spelling teaching methodology using a spell checker. The proposed teaching methodology is supported by theoretical hypotheses drawn from the field of cognitive psychology associated with the learning of spelling and pedagogical principles associated with the teaching of spelling. The efficiency and effectiveness of the proposed teaching methodology were evaluated in a trial based on Romiszowski's *Model for the Design of Education Systems* (1986).

The trial involved 25 subjects: 20 francophone and five anglophone civil servants from a Canadian federal government department, each investing an average of 10.5 hours spread out over a period of four weeks. Quantitative and qualitative data were gathered to evaluate the efficiency and effectiveness of the methodology.

The teaching interventions in the trial varied according to the subjects' gaps in spelling knowledge; were based on a linguistic error typology proposed by Catach et al. (1986); and had recourse to the spell checker **HUGO** 5.1 (1991) developed by Logidisque of Montreal (Canada).

The trial confirmed that the teaching methodology was efficient for certain error categories. It also revealed that the error category related to electronic text was very useful in identifying those subjects deficient in the strategy of proofreading. But results indicated that the linguistic-based typology chosen was not adequate from a teaching point of view concerning the distinction between grammatical morphemes and grammatical homophones. Similarly, the limitations of the spell checker did not allow for adequate treatment of punctuation.

The qualitative data gathered during this trial enabled a judgement to be rendered as to the effectiveness of the teaching method and shed light on improvements to integrate into the methodology.

CREDITS

ORTHO-DIDAC was developed under a grant provided for innovations in training by the Treasury Board of the Canadian Government. Three departments of the Canadian Public Service shared the responsibility of producing **ORTHO-DIDAC**.

COURSEWARE CHARACTERISTICS

ORTHO-DIDAC is a tool to:

- evaluate
- learn
- revise
- improve lexical and grammatical spelling in French

ORTHO-DIDAC provides:

- a diagnostic test
- proof-reading exercises
- validation of the corrections

ORTHO-DIDAC allows users to:

- evaluate their knowledge of French spelling
- choose exercises corresponding to their needs
- validate their corrections
- learn how to use a spell checker efficiently
- progress at their own rhythms
- work to their own schedules
- familiarize themselves with work-related texts

ORTHO-DIDAC is divided into two parts:

- a diagnostic test to identify areas of spelling problems
- proof-reading exercises based on these problems

ORTHO-DIDAC:

- manages the use of the spell checker which serves as a support in correcting
- suggests strategies to use the spell checker efficiently
- suggests a proof-reading methodology transferable to other situations

ORTHO-DIDAC includes elements of a tutorial:

- Drill/Practice: **ORTHO-DIDAC** allows the user to study different aspects of French spelling through different exercises related to the same category of error.
- Tutorial: After correcting a text, the user gets comments on the targeted errors that have not been corrected. **ORTHO-DIDAC** provides explanations on the spelling and thereby provides help in learning spelling in context.

ORTHO-DIDAC is user-friendly. The courseware provides clear instructions to help users follow the methodology.

CONTENT

ORTHO-DIDAC uses work-related texts chosen from written documents gathered in the Canadian Public Service and deals with the different error categories. The categories were identified using the typology of spelling errors developed by Catach et al. (1986) and a trial of a paper version of the courseware.

The lexical spelling category includes:

- typing mistakes
- sound-spelling association
- double consonants
- etymological and historical letters

The grammatical spelling category includes:

- gender agreement
- number agreement
- verbs

Synthesis activities are provided for:

- lexical spelling
- grammatical spelling
- a combination of lexical and grammatical spelling

SUPPORT TO LEARNING

ORTHO-DIDAC provides learning hints/messages. By clicking on the AIDE button, the user can get the description of an error category or the purpose of a step in the correction strategy.

During the validation phase, messages on user uncorrected mistakes add to the learning process. The word, correctly spelled, is highlighted to create a visual image in the user's memory.

Instructions on the use of the spell checker also serve as learning hints. These instructions are closely related to the category of error.

CONTEXT OF USE

It is not necessary to be enrolled in a specific training program in order to use **ORTHO-DIDAC**. The courseware can be used in a various ways such as a support learning aid to a course on French spelling or as a stand alone learning aid for individual revision.

HOW TO USE IT

The structure of **ORTHO-DIDAC** allows each user the flexibility to tailor its use to personal needs and learning styles. The following user mode is presented as an example that maximizes the capabilities of the courseware therefore allowing for optimal results.

- When using **ORTHO-DIDAC** for the first time, test your knowledge with the test diagnostic. After analyzing your results, **ORTHO-DIDAC** will recommend categories of errors to study. Note the recommendations using the learning plan provided in the documentation since in its present version, **ORTHO-DIDAC** does not store test results in memory.
- Choose a category of error according to the recommendations of **ORTHO-DIDAC**. You should follow the suggested progression since error categories are treated in order of difficulty. If the meanings of the error categories are not evident to you, a help message will provide you an example of each category.
- You have the option of choosing three texts according to a different level of difficulty: easy, moderately challenging, and challenging. Choose the text which seems the most appropriate. However, it is recommended that you choose the three texts in the suggested order.
- It is strongly recommended that you adopt the following proofreading strategy. An analysis of the data obtained from the participants in the pilot trial reveals it to be both effective and efficient.

Proofreading strategy

- Print a paper version of the text.
- Correct the mistakes on the paper version using your own knowledge of French spelling.
- Use the spell checker as a word processor to correct the previously detected mistakes on the paper version and to perform a second revision. The spell checker can then be used as a reference tool. According to the error category, **ORTHO-DIDAC** suggests the use of specific functions of the spell checker.
- Use the spell checker in the verification mode. The spell checker stops on words having a dubious or unknown spelling. Make the necessary corrections.
- Print your corrected version of the text.
- Validate your correction. **ORTHO-DIDAC** will stop on words incorrectly spelled giving you the proper spelling with an explanation. It is useful to transfer the corrections to your corrected printed version in order to store in your memory the correct spelling of the word. **ORTHO-DIDAC** gives you your score. Record your score on the learning plan, and on the reverse side, design a graph on which to chart your proficiency.

It is possible to redo the same exercise at a later time since **ORTHO-DIDAC** does not keep your corrections in memory. This can help you to evaluate your progress.

SPELL CHECKER

In its present version, **ORTHO-DIDAC** works with the spell checker **HUGO** 6.3 and 7 and manages access to the spell checker.

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PRESENTERS' BIODATA

Lise Desmarais holds a Ph.D. in education. She is a specialist in language teaching at the Department of Foreign Affairs of the Canadian Government. The software presented is a follow-up to her dissertation on developing a teaching methodology for French spelling using the spell checker. She is interested in various aspects of foreign language acquisition and teaching methodologies. She also has a special interest in the use of technology as a learning tool.

Jean-Roch Roy is a computer science student at the University of Ottawa. He has been involved in authoring various computer based training programs.

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THE NEXTSTEP IN LANGUAGE TEACHING: DESIGNING OUR OWN COURSEWARE

COURTENAY B. DODGE AND MILLY SÁNCHEZ

ABSTRACT

At Allegheny College we are using the **NEXTSTEP** programming environment to tailor applications to our own courses and teaching styles. Our courseware is designed to simulate activities and experiences which place the language in a cultural context and which can allow students to engage in more active laboratory assignments where they can develop all four language skills using sound, images, and text. **NEXTSTEP** allows teachers and developers to work together to create easy-to-use didactically sound products.

INTRODUCTION

Computers are an important resource available to the Allegheny College community. Users can send documents or voice messages over the network, converse through the keyboard with German-speaking people scattered around the world, access a remote library card catalogue, work on a computer-guided French poem analysis, or play a Spanish game about physical traits – among other things.

We use the **NEXTSTEP** programming environment to tailor applications to our own courses and teaching styles and are primarily interested in creating courseware designed to simulate activities and experiences which place the language in a cultural context and which can allow students to engage in more active laboratory assignments where they can develop all four language skills using sound, images, and text.

Applications development began at Allegheny several years ago when the college decided to adopt the use of the **NEXTSTEP** operating system and began to build teams of faculty members and programmers to design courseware. **NEXTSTEP** was chosen not only for its advanced capabilities and its user-friendly interface but also for its object based programming system. In our demonstration, we will show two applications which were developed in a relatively short period of time by using its tools and objects. **NEXTSTEP**'s **Project Builder** provides the means by which teachers and developers working together can create easy-to-use didactically sound products.

The Language Department faculty, with partial support from the Charles Culpeper Foundation, began one and a half years ago to work with an applications developer on a variety of assignments and applications to complement the materials and teaching methods used in our courses. This enables us to assign laboratory work which is fully integrated into the course. Although we are still in the early stages of our project, we already have a number of applications in use and others in progress.

CALL PROJECTS AT ALLEGHENY COLLEGE

Language Learning projects fall into two basic categories. The first includes a number of "all-purpose" programs which can be used to create a variety of assignments of the same type. These include, for example, a dictee program where the instructor can create a dictation, have the student listen and write (while viewing a picture if desired), and can allow the student to access the written text or not as the teacher wishes. Another application used in many courses is a "discussion" program where students can post questions and answers regarding course content.

While we use a number of these general applications in teaching languages, we will focus here on two applications which fall into the other category, that of more complex programs designed to contain information and activities related to specific courses. The first is a game called **Guess Who** used in beginning level French, and the second is a program used to teach French poetry and explication *de texte* in a course on Introduction to Literature.

GUESS WHO

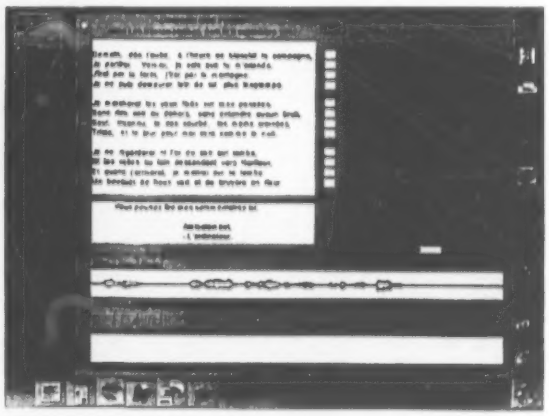
This application is adapted from a Milton Bradley children's board game of the same name. The object of the game is to discover by process of elimination the perpetrator of an imaginary crime. The computer randomly chooses the guilty party from a series of characters whose portraits appear on the screen. The student then asks a series of pre-formulated questions which appear below the portraits. Based on the response to each question, certain suspects can be eliminated. This question-answer process continues until the student can determine the criminal. The computer keeps track of the number of questions asked thus producing a score.

The menu in the upper left-hand corner shows access to information, rules and examples. One eliminates a portrait by clicking on it (as seen by the blank spaces above). When students click on a portrait, they see (in the message box) and hear the person's name. When they click on a question, they hear both the question and the response. The response also appears in the box labeled Reponses.

This relatively simple game reinforces a number of vocabulary items and grammatical structures taught in an elementary level French course. We want the student to focus on playing the game, i.e. on solving a specific problem, using only information obtained in French. Enough cues, visual, aural, and written, are provided to enable the student to be successful. At the same time, he is learning a number of grammatical structures that often cause problems for beginners in French as well as vocabulary used to describe people. While playing this game, students learn and use the elements of language within a context, have the structures reinforced both aurally and visually, and spend more time on the exercise, thereby increasing their exposure to the language.

POETRY

This application is used to increase familiarity with the poems taught in the Introduction to Literature course and to help students master some of the techniques of *explication de texte*. In addition to working on analysis of form and content, students can practice aural comprehension and pronunciation. The archive building capabilities of the computer also permit the addition of cultural and historical information related to the poems. In the poem shown below, for example, students can view portraits of Victor Hugo and his daughter by clicking on the menu item, portraits. For another poem by Ronsard, we have included a Renaissance song version of the poem in addition to a spoken version.



The screen shot reproduced above shows some of the activities students can practice. Clicking on the button to the left of the title plays a recording of the poem. By clicking on the button to the left of a specific line, the student will hear only that line and will see the voice pattern of the person speaking (in the box labeled "Native speaker's voice"). The student can then repeat the line while recording his/her own voice and voice pattern in order to compare them with those of the native speaker.

The first exercise to the right of the poem asks for identification of all of the mute e's pronounced in the poem. In the box below the poem, the student receives information regarding the correctness of his/her responses. Additional self-correcting exercises deal with other aspects of versification and

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form. More open-ended questions on form and content are included in a document which can be completed and sent to the instructor for correction.

This application provides students the opportunity to practice pronunciation and analysis on their own and to learn the poems thoroughly. As we add more poems, we will provide opportunities to do analyses of a wide variety of poetic forms. Such applications are never really finished since we anticipate adding to the archival sections for each poem as we locate appropriate materials.

CONCLUSION

These two applications illustrate the types of products we are developing by working together, teacher and programmer. We are finding ways to exploit the capabilities of the technology in order to generate assignments and activities that are interesting and engaging and which will accelerate acquisition of language and culture. We are still at the brainstorming stage of applications development where each new application is an experiment. As we use them and assess student reaction, we are making modifications and improvements. Although student and faculty reaction is very positive, it will be some time before we can accurately assess the real effectiveness of our products. It is clear, however, that there is one immediate and highly beneficial by-product of the development process for language teachers — the careful thought regarding language learning that is a necessary part of each application design.

PRESENTERS' BIODATA

Courtenay Dodge is associate professor of French at Allegheny College where she teaches all levels of French language and literature. Ph.D., The Pennsylvania State University, 1976, with a specialization in linguistics. Her interest in designing language courseware is an outgrowth of research on foreign language pedagogy.

Milly Sánchez graduated in 1992 from Allegheny College with a B.S. in Computer Science and French. She develops Spanish and French applications and is the language lab director. She hopes to pursue graduate studies in computational linguistics to continue writing language-teaching software.

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The Factor of Factors

Marina Dodigovic

ABSTRACT

The computer has revolutionized the role of the teacher, within and outside the classroom. The teacher who uses the existing software in the classroom becomes an education manager. The one who develops his or her own programs plays an extremely complex role in the process. He or she is not just a programmer, but also a designer who has to come to grips not only with screen ergonomics, but also with the metacommunicational and cognitive functions of it. A little bit of being an artist is a part of the role too. If the program is to use knowledge representation, the teacher has to be a knowledge engineer as well. If the program is to have integrated videos, the teacher may have to do the job of a film director. The importance of the human factor behind the machine increases. The Bremen Multimedia Initiative explores the human factor using a videomachine and **ToolBook/IconAuthor** to develop CALL applications.

INTRODUCTION

We, the teachers, carry a great responsibility. We make decisions on what to use for teaching and how to use it. We are the managers. The variables we manage are learners as a complex set of variables, content (a complex again), time, place, and means. Means and media of education are also vastly complex. We have to be familiar with them and also be able to make justified use of them. Finally, we have to be capable of mastering one extremely important variable — ourselves. For all these reasons, a language teacher has to be open-minded towards the new technology, explore it restlessly, find out where it intersects with the needs of his or her particular learner population, and decide on when and how to use it.

Occasionally, there are time gaps, during which a certain technology develops to the point where it could be used in the class, but there are no appropriate materials to feed it. A dedicated teacher tries to produce some of his/her own. With the advent of personal computer some ten years ago, the really involved language teachers realized the potential of it as an educational medium, and, in order to bridge the gap between the hardware facilities and the lack of suitable software, they started developing and using software that would appeal to their own students in almost every respect.

CALLWARE DESIGN FEATURES

Text

In the "early days," CALLware design was chiefly based on behavioral theory and programmed learning from the psycho-pedagogical point of view, whereas from the point of view of screen design ergonomics, it was more or less confined to text presentation. Enthusiastic amateurs flooded the software market with screens full of endless, cramped text, messages running over messages, boxes popping open practically everywhere, blinking in shrill colors right into the mind of a desperate novice, who at that point spontaneously decided to hate computers all his life long.

A much better starting point for screen design is anchored in educational theory, behavioral as well as cognitive. Both theories agree to a certain extent as far as computer based instruction/learning is concerned. Most cognitive theories support some form of information processing, where mental events are described in terms of non-observable transformations of information from input (stimulus in behavioral theory) to output (response) (Hannafin

and Rieber 1988). Behaviorally-based principles for designing programmed instruction include objective specification, empirical testing, self-pacing, overt responding, immediate feedback, controlled sequencing, small step size, low error rates, prompting, and confirmation. Cognitive learning foundations include encoding and retrieving as two basic subprocesses within an information-processing system, which implicitly relies on small basic bits of information that have to be elaborated and organized by the learner, prompted by the events of instruction.

The implications for screen design are the same: a nice clear screen with fragmented units of information that belong together is preferred. Moreover, the fragmentation of messages is introduced into instructional science in connection with media in general (media being anything from book over lecture, audiovision, and film to computer) by John H. Mason. He defines a fragment as "a recallable incident which spans a single block of time" whose "content...can be agreed upon by two observers of the event" (Mason 1988). Supposedly influenced by semiotic (Eco 1973), cognitive (frames), and knowledge representation (scripts) theories and close to film domain, Mason tries to establish the basic unit of a system, which would be universally identifiable on the paradigmatic level. On the syntagmatic level, these "fragments are then woven together to make a story about the experience, which is what is often called construal or making sense" (Mason 1988). Teachware produced in accordance with this hypothesis should "be prepared so as to focus students' attention on the need to reconstruct the content for themselves from the fragments they can recall" (Mason 1988). In video media this is, in Mason's opinion, achieved by zooming, split screen, color separation, short segments, animation, ability to stop/replay, change of visual frame, subject, and pace.

Fragmentation or segmenting of information also has strong claims on text presentation in the context of computer-based instruction or learning. The research does not leave it unconsidered. For instance, Mark G. Gillingham supplies very useful guidelines for text presentation in computer-based instruction. He introduces five basic terms describing the chief text features:

- length (how much text on screen at a time),
- amount (how many single screens),
- rate (how fast the single screens exchange),
- color (as a factor influencing readability and comprehension), and
- structure (logical organization).

As regards the length of text, he quotes the conclusion of International Reading Association: "Display as many legible double-spaced lines as the screen will comfortably hold" (Gillingham 1988). Rate, color, and structure of text must be such as to enable eye-fixation and comprehension. Logically well organized small items and individually adaptable rates are preferred.

While trying to establish universal postulates for text presentation, the research does not explore individual contents. Some instances of this do occur however. For example, Marie Stratil found that computer-assisted grammar learning ought to be based on a concise and informative explanation style, flexible browsing approach, and a presentation order differing from the order presented in a standard grammar book (Stratil et al. 1987). Although the author does not interpret the significance of the order of presentation, it may well be connected with the difference between a traditional descriptive and communication oriented grammar.

Image and Animation

The alphanumeric screen terminal was the first output device to replace or accompany the printer. It introduced little novelty into the world of basically textual interactive media. However, it was soon followed by the graphic station, which led a step further into the fantasy world of senses and communication. It offered image and animation, facilities to go hand in hand with modern cognitive theories. Studies on the instructional effects of visuals have abounded. The most prominent theoretical support for pictures is the dual-coding hypothesis, which suggests that humans possess both visual and verbal encoding mechanisms. Fundamental differences between learning styles have been identified, based upon the relative abstractedness of to-be-learned information: the more concrete, the easier to picture and remember; the less concrete, the harder to picture and remember (Hannafin and Rieber 1988).

The audiovisual language teaching method anticipates in part this development. It tries to present the matching nonverbal context of a language situation in the form of pictures and videos. It supersedes, however, and sometimes even completely

bans the native language verbal explanation, which eventually does not facilitate comprehension. At its best it is represented in the PLATO system. The first PC-based CALL programs were chiefly written by language teachers, amateurs in programming, and therefore based on text mainly.

Professional programmers, strange to language teaching, on the other hand, preferred to bring in graphics and animation as the potential of the medium. So for example, John Higgins, basically a language teacher, had his first CALL programs developed by his wife, Muriel Higgins, a computer specialist. These early programs were enriched with graphics and animation, whereas the later ones, produced by John Higgins himself, who in the course of time acquired basic programming skills, were exclusively text-based, using however the benefits of color and animated text-shifting.

It would, of course, be wrong to use graphics and animation just because they are possible, without any real reference to the content. In my program **PREPOSITIONS**, I use graphics to demonstrate the exact field of meaning of German spatial prepositions, and animation to show the difference between static place and dynamic direction. I also use animated text to visualize the concept of word formation. Russian CALL programs written in the mid and late eighties show perfection in both glotodidactic and programming aspects. Designed by teams of language teaching and computing specialists, they achieved a perfect balance between verbalizing and visualizing, between formulation and meaning, between color and movement, without ceasing to be interactive, without taking away the chance for the learner to assess his or her own answers.

Sound

We all know that an important part of natural language is sound. The early CALL programs were in that respect frighteningly silent. That is in the first place why certain language specialists decided to ban the computer into the isolation of individual drill-and-practice. Two major achievements turned against this scheme: speech synthesis and digitized speech.

CD-ROM came just in time to support storing the enormous amount of information immanent to speech. Software to process digitized speech made it possible to alter the speed without the change in pitch and vice versa. Convenient dialect and sociolect variation was made possible. Background noises can be inserted, altered, or completely erased, depending on the difficulty of the educational task or the preference of the user. Sound mixing became that way one of the standard component parts in the process of developing language software. Checking the student's aural input by means of computer also became possible. Through sound facilities, human-computer communication made an important step further towards being "natural."

Natural Language Processing

Intelligent language tutors are nowadays expected to reach the high standards of natural communication and analyze free language input as well as synthesize answers. In natural language processing, there are two basic approaches. One implies that natural language is context-free and therefore only syntactic properties matter when it comes to parsing; it relies chiefly on the predicate calculus and transformational grammar. The other takes for granted that natural language is not context-free; it is influenced by mainstream thoughts from the field of artificial intelligence; it uses methods of knowledge representation to parse natural language input, involving conceptual graphs, frames, and semantic networks.

What both these approaches have in common is an increased awareness of the complexity of learner's psyche, of the multitude of communication channels available to reach it, and of the finest possible analysis systems required to assess the learner's answers, which would be able not only to tell whether an answer was correct, but also why it was given. John Higgins (1988) believes that it is the prerogative of a good human teacher alone to be able to respond to these requirements. I would rather say that it is a prerogative of any sensitive and benevolent human expert, hence also of the software designer, to approach the whole complexity of the learner's personality.

Video and Hypermedia

The video-machine, video-player, and CD-ROM gave a rise to a new multimedia wave in CALL. It became possible to feed the computer with visible, audible, moving reality, to play with it, change and restructure it, prepare it for metacognition, integrate it into classical exercise. The appearance of hypermedia systems in the late eighties enabled seamless fusion of text, video, computer graphics, animation, sound, natural language processing, indeed any technologically feasible form of presentation.

Authoring tools and systems, such as **ToolBook** or **IconAuthor**, made the creation of most exciting intelligent multimedia software accessible to practically anyone willing to undergo the now reasonable software and hardware expenses. This, in turn, increased the demand for knowledge and responsibility on the part of the developer, which a language teacher with a little bit of computer usage skill can easily become, but very seldom defend against the burden of demand for mastery in various disciplines.

SOFTWARE DEVELOPMENT

The responsibility of the creator is enormous. I have seen tutorials produced by the students of electronics at the Bremen Polytechnic that contained almost every imaginable medium: text, metatext, video, animation, sound. Each separate element was good, but the product as a whole was poor. The cables in an animated illustration moved where their purpose was to perform a static function, the voice reading a message was irritating, rather than facilitating comprehension. Basic information was overflown in a fit of youthful impatience. The user was not given a single chance to ponder over the most important facts.

No wonder at all. The developers had the technical facilities to put various pieces together, but they absolutely lacked didactic, psychological, and film directing knowledge so necessary in order to be successful.

John Mason stresses the importance of arranging single fragments. He uses the analogy of a film editor who can, by changing a sequence of shots, amplify an actor's performance (Mason 1988). He further claims that the television, film, and advertising industries are generally more successful than the education industry in getting and maintaining people's attention, assisting people to internalize the gist of a communication, and ensuring the long-term retention of elements of the original communication, chiefly because of the fact that they are better at manipulating attention through well suited choice of media and appropriate sequencing of events.

At the Polytechnic of Bremen we decided to furnish our language lab with computers, the purpose of which was to be a compromise: the students were to use the computer in their spare time for self-study. In order to persuade the rather traditional staff to use the computer themselves in the classroom, we had to integrate it into their courses, which, of course, called for developing new software, matching their familiar tapes and course-books.

The first program was to contain a unit all of the teaching staff use in their basic courses: numerals. The material they supplied were their original tapes, texts, drawings, and exercises. Considering the nature of the unit activity, the program was to integrate sound, graphics, animation, additional still-frames or video material interactively. The development could luckily be done in cooperation with a private enterprise, which invested the following capacities: a video-machine to mix the sound, process video-clips to do the animation; a professional cameraman and film editor; and a multimedia technology expert. We brought in our own modest CALL experience, education in and love of fine arts, plenty of unpaid overtime, and a lot of care for the students.

The result is a program which involves almost all of the tackled "human factors." However, its most human factors are not in it. They are the communication partners in the process of development and usage of the program, its developers, and potential users. The developers hope to be able to convey the message to the teachers: "Use the computer in the classroom. It does not do your job without you." and a message to the students: "Language learning can be fun, you know."

THE MOST HUMAN OF ALL "HUMAN" FACTORS

The human behind the machine, most susceptible to human factor errors, is expected to work wonders with his or her imagination, knowledge, sympathy, understanding.

Computers can turn into an irritating burden if the software developer does not bother to create the right kind of metareality for the learner. After all, the output of a computer only equals the input we feed into it, summarized so brilliantly in the programmers' motto: "Garbage in, garbage out." Developing courseware involves a vast knowledge, not only of the subject matter or computer, but also of the learner and all the media computer is to replace, that is to say all the "human" factors. Proper application of this knowledge is the privilege and obligation of the most human of all "human" factors – the human.

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PRESENTER'S BIODATA

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A MULTIMEDIA EXTENSION OF THE "NATURAL APPROACH"

MARTINA ELISABETH EIDECKER

ABSTRACT

CyberBuch is a multimedia approach to German language teaching which is designed to facilitate the transition from first year German to the second year, when students are asked to read authentic texts. The program helps to teach reading strategies since it offers not only a text, but advanced organizers which contextualize the text through the use of movies, photographs, and background information about the topic as well as the author. According to the philosophy of the "Natural Approach", language acquisition and learning only take place in the target language. This notion is reflected in the program through glossaries in simple German, supplemented with movies, pictures and voice to convey meaning, rather than translations in English. Such uses of multimedia can enhance the language acquisition process.

The program **CyberBuch**, a multimedia approach designed to help German students acquire reading skills, was developed by a team of German instructors, programmers, and graphic designers at the University of California, Santa Barbara. In this presentation, I would like to demonstrate how this program can be used in a Natural Approach classroom. I will first briefly describe the acquisition-learning theories and hypotheses developed by Krashen and Terrell (1983, 25-51) and then show how our multimedia program can be used as an extension of the Natural Approach.

According to the theory of Krashen and Terrell there are two ways for adults to learn a foreign language: by acquisition and by learning. While learning means "knowing about a language," referring to a formal knowledge a speaker might be confronted with in a traditional classroom setting, acquiring a language means getting to know and speak a language in a natural setting, that is, in a real communicative situation. Transferring meaning, then, becomes the center of any act of communication, rather than practicing a set of rules or a certain grammatical pattern. Considering the "natural way" in which most people acquire a new language — and most of the language acquisition worldwide takes place outside of the classroom — one has reason to believe that traditional language teaching does not fully appreciate the fact that languages are learned successfully, and in many cases rather quickly, in situations in which formal grammar teaching and drilling do not play any role. If they do play a role though, it is in an implicit way only. Most of the time the speaker is not even aware of the underlying rules and is not able to explain them — which is in fact the case for speakers learning their native language. Thus, language learning "is a subconscious process; children for example are not necessarily aware that they are acquiring language, they are only aware that they are communicating. The results of language acquisition, acquired linguistic competence, are also subconscious" (Krashen, 26).

Terrell and Krashen emphasize the fact that their second language acquisition theory can be applied both to children and adults although both acquire second languages in different ways and children are the ones who in the long run "will usually reach higher levels of competence than those who start as adults. Over the short run, however, adults are faster in attaining second language proficiency than younger children" (Krashen, 45). This is true because older acquirers "are able to get more comprehensible input" due to extensive knowledge of the world, which a child still has to acquire along with his/her first language. The ways in which a foreign language is acquired, however, seem to remain the same (Krashen, 45).

Another aspect of the Natural Approach is the Monitor Hypothesis, whereby Krashen and Terrell propose that conscious learning can only function as a monitor or editor in language performance — and therefore is usually only useful in written language. As a

matter of fact, even the notion of monitoring one's own language production leads to an emotional fear of even producing in the foreign language. This limits the process of communication and thus undermines what language is all about (Krashen, 30).

Krashen and Terrell's Input Hypothesis claims that the process of acquiring a language always requires an input "that is a little beyond our current level of (acquired) competence" (Krashen, 32). This point is decisive in order to emphasize the challenge which is implied in acquiring a language and knowledge about the world. What has to be established is meaning, even in cases where meaning is not as easy to obtain because the language used refers to an abstract world. The input given serves to increase the understanding thus creating meaning, while at the same time being a challenge and an exposure to something new.

The Input Hypothesis centers around listening and reading comprehension since the ability to produce (speak and write fluently in a foreign language) will come with time and increased input. Competence is only built up through input which is comprehensible. Although the level of this input might go a little beyond the understanding of the second language learner, the listener takes into consideration context and extra-linguistic information (Krashen, 32). This means that we use meaning/content to acquire language competence, not grammatical patterns or rules.

To create meaningful situations the foreign language teacher using the Natural Approach has to be aware of the contexts he or she can create and of the materials used that go beyond the language as such, e.g. pictures, paintings, audio tapes, cultural artifacts, and of course, gestures.

Terrell and Krashen developed the definition of the level of input received by the foreign speaker as "i + 1," (Krashen, 32-33) a "finely-tuned input" (Krashen, 33) in the Natural Approach classroom. The teacher talk provides the student with this kind of input, because it is a form of modified foreigner talk (Krashen, 34).[1] While communicating meaning in the teacher talk mode, the students receives new input again.

To summarize, the major points of the Input Hypothesis according to Krashen and Terrell (Krashen, 37) are:

- The concern is more with acquisition, rather than learning.
- Learners acquire by understanding language a bit beyond their current level of competence. This is done with the help of context.
- Spoken fluency emerges gradually and is not taught directly.
- When caretakers talk to acquirers so that the acquirers understand the message, input automatically contains "i + 1," i.e., the grammatical structures the acquirer is "ready" to acquire.

The final aspect of Krashen and Terrell's theory to be discussed here is the necessity of a low affective filter in the classroom, i.e., an atmosphere should be created which allows for a low anxiety level: "A low filter means that the performer is more 'open' to the input, and that the input strikes `deeper,' to use Stevick's term" (Krashen, 38). This, on the other hand, does not mean that the classroom situation should not be challenging. If the classroom is managed according to the "i + 1" – rule, then the language input in itself will create a challenging atmosphere and maintain the students' motivation to understand, as well as keep the attention-level high.

Having introduced the main features of the language acquisition theory by Krashen and Terrell, I would now like to demonstrate how the **CyberBuch** program developed at the University of California, Santa Barbara can be used as an extension of the Natural Approach classroom.

The transition from the first year of German as a foreign language to the second year level seems to be particularly difficult because students, especially those who are taught in traditional classrooms, are not prepared to deal with longer text passages that confront them with complex new ideas as well as an extensive new vocabulary. To facilitate this transitional period we created **CyberBuch** to enable students to develop strategies for dealing with and "digesting" the new form of input, i.e. extended written texts.

CyberBuch is not a "book" in the traditional sense, but a multimedia approach that offers several advantages over a printed text. First of all, it is an interactive approach in which the computer takes on the caretaker's role of the natural approach offering teacher talk. Secondly,according to Krashen and Terrell's acquisition theory, students must be

able to create a meaningful context "around" a text. In second-year German, a student's background knowledge of German literature is very limited; names of authors or titles alone do not mean much to the students. Therefore, **CyberBuch** offers not only background information about the author and the time in which he or she wrote, but also a so-called *Vorschau* or "preview" for each text, which gives some insight into the topic presented. This *vorschau* not only gives information but creates a "setting," using pictures, movies, and sound, and stimulates interest in the problems the text tackles.

This variety of background information, statistics, historical background, and author information thus both increases the students' interest in the topic presented while simultaneously serving to enhance the context, which is first established in the Natural Approach classroom by the teacher. The main body of the program is the text, which confronts the student not only with a fair amount of new vocabulary but additionally with complex new ideas and problems, often reflecting a very different understanding of the world. Only knowledge or awareness of the context in which the text appears can help to clear up cultural misunderstandings and ensure an understanding of the problems presented.

To return to the notion of natural language acquisition, there are various ways in which native speakers try to create meaningful situations for the foreign language speaker. They must use any mode available — a situation that a multimedia approach is able to simulate more readily than a traditional book. The **CyberBuch** program contains a glossary that defines unknown words in the target language using very simple German that should be understood by any second-year German learner. This glossary functions the same way that a native speaker would attempt to define unknown vocabulary to a foreign speaker. In terms of the Natural Approach, it takes the place of teacher talk and is modified by the specific knowledge a teacher has about what his or her students should know in the target language at the time they encounter this new vocabulary item or phrase.

In a "natural" situation, native speakers use other means of communicating besides language, too. Gesturing plays a decisive part, a fact we have considered in developing **CyberBuch**. For example, in order to explain certain vocabulary items, specifically action verbs, movies are used to illustrate or demonstrate the action. Photographs can serve the same purpose and are frequently used for concrete objects or items, that is, nouns. Thus, where a native speaker might act out activities or show items or point to them, **CyberBuch** uses movies and photographs. The vocabulary items are further reinforced by audio repetition, i.e. upon seeing a movie or photograph. Students also hear the word or phrase spoken by different German speakers.

Since the students can choose the help they prefer, i.e., definitions, movies, pictures, sound, or all of the above according to their own learning style, the affective filter is lowered. In other words, students can receive new input in the target language without the control of the teacher.[2]

The input presented, that is the text used, is always a challenge to the student, which the natural approach defines as "i + 1." Since texts often even go beyond this "i+ 1" — this is especially true for traditionally trained students — it is important to lower the affective filter. The use of multimedia seems to make it more enjoyable for students to acquire language: through pictures and movies, without the control of a teacher, at one's own speed, and by one's own choice of the different media links.

Besides looking up words in the glossary or accessing picture or movie links, the student also has the opportunity to hear selected parts or all of the entire text read by German speakers. Students simply click anywhere on either side of the text to hear a narration of the text or dialogue spoken by different speakers. This reflects a real-life situation in that native speakers all speak differently and students must learn to understand different accents and intonations of different speakers.

In addition to being able to hear words or the entire text spoken, learners can also record themselves speaking individual words or entire paragraphs using the "Record" function. After recording themselves, students can compare their pronunciation with that of the native speakers.

In order to check students' comprehension, the programs allows instructors to pose questions at major text breaks. Students can then type their answers into a NoteBook. The programs provide the option of having students answer the questions either while reading the text or after they have finished reading the entire text. We find it advisable to check comprehension after every passage to en-

sure understanding on a global level, and at the same time enable the student to review a specific segment if they feel the need to do so.

Krashen and Terrell, on many occasions, pointed out that language production follows language acquisition. Production therefore comes in the later stages of the **CyberBuch** program. At the very end of each text, students are asked to write an essay about the text or a related topic dealing with the problems presented in the text. The earlier questions throughout the text are designed to lead into a more global understanding and the students' answers to those questions can form the basis for the longer essay. At this point the interest level, knowledge, and input of new vocabulary are extensive enough to enable students to create something on their own in the target language. The learning, having taken place before actual production, comes about subconsciously, yet the program has gradually led the student to this stage.

In conclusion, I propose that a computer program such as **CyberBuch** can partially fulfill the role of the "caretaker" in the Natural Approach. The program is a partial substitute for the teacher and "teacher talk," providing new input on a highly organized level, i.e. in Terrell and Krashen's words, "finely-tuned input" (Krashen, 33).

CyberBuch thus offers help for any student from any methodological setting, although students trained in the Natural Approach might at first benefit more from the program since they are used to dealing with input slightly above their level of competence. Other students can also benefit because **CyberBuch** develops strategies for dealing with unknown material. These strategies can be transferred to future encounters with written or spoken German. As an extension of the Natural Approach classroom, multimedia programs are thus potentially very useful supplementary tools.

NOTES

1 Ibid. 34: Terrell and Krashen define foreigner talk as the language (including body language, pictures, etc.) a native speaker uses to reach a foreigner on his/her specific level of understanding.

2 The traditional teacher role seems somewhat to counteract the idea of fearless language acquisition.

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Keynote Address: Cruisin' the Information Superhighway in My '57 Chevy: Farewell to Rte. 66?

Gerard L. Ervin

ABSTRACT

Much has been written about the "information superhighway" of late, but few of us have more than a superficial sense of what it is all about. This paper attempts to present the information superhighway — more properly, the "National Information Infrastructure" — as a graspable whole, beginning with its improved human factors (ease of use, or ergonomics), increases in the extent of its offerings and number of users, and its advancing technology that is growing ever faster, better, and cheaper. The information superhighway is described as having four principal functions: information, communication, services, and entertainment. Finally, this paper suggests some of the challenges that the information superhighway presents to the foreign language teaching profession.

NOTE

Gerald Ervin's complete Keynote Address was published in the Spring 1994 (Vol. 11, Number 3) issue of *CALICO Journal*.

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"Writing Safari": Computer Assisted Writing Development for Deaf Students

Karen Farrow

ABSTRACT

This paper presents the pedagogical background and project description of "Writing Safari" — a **HyperCard** project funded by the National Languages and Literacy Institute of Australia to develop a computer assisted writing instruction program for deaf students. The principles, concept, and design also have potential applicability for ESL and other second language writers.

Assumptions about inadequate access to input for language acquisition and various approaches to language pedagogy have restricted opportunities for deaf students to develop discourse capabilities and a perception of English as communication.

To reinforce that writing is for communication, a "friendly" computer interface has been designed incorporating digitized photos, scanned colored realia (postcards, brochures), an on-screen personal notebook, and an icon based "Writer's Survival Toolkit."

The project presents authentic models of writing encountered in the context of a trip. It adopts a top-down genre-based approach to writing instruction emphasizing meaning before form, writing for real social purposes, and context, audience and purpose as guiding elements in language choice. The computer interface (screen graphic design, navigation icons, and visual features supporting language) reflects these pedagogical principles.

The paper has been adapted from a paper presented by Farrow, Power, and Freebody (1994).

INTRODUCTION

The concept of the writing program as a "writing safari" was developed to create a sense of adventure; to expand the horizons, concepts, and language of the students beyond the classroom and immediate environment; and to provide a story context that facilitates purposeful writing for an audience. A concept map of the Safari is presented in Appendix A.

The program's story is based on a trip to Kakadu in Australia. The student accompanies computer characters who read and write a range of genres (Narrative, Report, Recount, Persuasion) for real social purposes as models for users to enter in an on-screen notebook and off-screen diary. Characters' and users' tasks are to write letters, diaries, and reports about the trip to different audiences. "Templates" for different genres, checklists and guidance for effective writing will be available on-line for the learner's reference.

One particular feature of the program is a "Survival Kit" which has been designed as a "kit" of tools to assist learners to explore aspects of language in models on screen and in their own texts, such as: genre, schematic organization, clause relationships, vocabulary, and punctuation (refer to Appendix B). The toolkit includes a "Danger Zone" tool which is directed specifically to raising awareness of common pitfalls in deaf writing and providing students with models of the editing process.

Heightening students' awareness of purpose and audience in writing and how these factors influence the language choices made is a focus of the "Airport" section which presents a range of realistic writing that one could encounter in this context

such as, newspapers, postcards, letters, competition forms, novels, petitions, tour brochures and signs (refer to Appendix A).

"Safari", the section that commences the central trip, presents excursion choices to learners via tour brochures presenting a mixture of the selected genres to emphasize that many communicative contexts call for a mixture of two or more genres.

Before elaborating on the key aspects of the program, the pedagogical rationale needs to be discussed in order to place the project in educational perspective.

PEDAGOGICAL RATIONALE

Despite their gradual approximation to Standard English rules, many deaf writers, even as adults, are unable to regularly produce Standard English and their development towards it is considerably slower than hearing writers of equivalent ability, even slower than NESB writers who in many cases more quickly achieve the use of Standard English in their writing than do most deaf students.

Why do deaf writers have so much difficulty in writing Standard English? At one level, the answer is that significant deafness impedes access to the sufficient quantities of accurate models of both spoken and written English necessary to allow the normal development of these skills.

At another level, in teaching English to deaf students, emphasizing the correction of form in isolated sentences at the expense of a focus on meaning, and emphasizing correction of errors and "correct language" as a goal have restricted opportunities for deaf writers to develop discourse capabilities and thus their perception of English writing as communication (Kelly 1987).

Teaching practice traditionally has reflected a concern with surface-sentence level aspects of learning by repeated correction and practice imposed upon the pupil by teacher activity (what Barnes, 1976 has called a "transmission model" of teaching and learning) rather than with allowing pupils to construct their own knowledge via interaction with the materials of learning; these materials being, in the case of language, modelling/demonstration of, interaction with, and practice in using more mature models of writing the "target language" for meaningful purposes.

We suggest a reorientation of our theories of language, language learning, and learning generally will go a considerable distance in improving the approach to writing development that we use with deaf students. Our language theory is one that focuses on meaning as the determining principle of developing writing with a secondary focus on form.

As far as grammar is concerned, we need to realize that the construction of text is a "top-down" process; a sense of purpose, topic, and audience provides a context for writing that generates discourse structures which include much more than attention to the minutiae of syntax and morphology. In "top-down" approaches to writing instruction, teachers must play a role beyond helping students to eliminate mistakes by assisting them to "envisage themselves as writers by demonstrating the uses of writing and by helping students to use writing themselves" for meaningful purposes (Kelly 1987, 192).

Our theory of learning generally must reflect the contributions that such writers as Bruner and Vygotsky have made to our understanding of the learning process: in particular, as we have noted above, of the centrality of the construction of meaning in authentic contexts and the fact that teaching does have a central role in organizing contexts and processes for learning such as are represented in Vygotsky's "Zone of Proximal Development" where the learner can be assisted to do things he or she could not do alone by appropriate modelling and structuring of learning experiences to the student's current level of development (Loera and Meichenbaum 1993), using inter alia, such notions as "scaffolding" of learning experiences (Wood, Bruner, and Ross 1976).

The computer-assisted writing development program is designed to meet these principles and to provide a learning environment in which deaf writers can be led to see purpose and meaning in their writing for its gradual improvement.

The above principles compliment a genre-based approach to language learning emphasizing context, audience, and purpose as factors which determine linguistic choices in writing. An important emphasis in our approach is to raise learners' awareness that writing is for real social purposes; e.g., to inform, entertain, or persuade. "Authentic," "real life," or "life-like" texts in the form of news articles, school reports, brochures, "social" letters,

postcards, diary entries, letters of persuasion, news reports, and information signs are presented to students in the computer program to provide a contextual base for language learning and models of realistic social language. Language presented should be linguistically rich, authentic, and contextually valid to provide a less restricted base for acquisition. This approach is supported in current literacy and deaf literature by Ewoldt, Israelite, and Dodds (1992) and de Villiers and Pomerantz (1992) who emphasize preserving authentic language in context.

THE COMPUTER AS AN ASSISTANT IN WRITING INSTRUCTION

How does a computer program integrate with our approach to writing instruction? The model of the role of the computer adopted by this project is as a tool to assist the teacher in instruction and individual learners to explore aspects of language meaningful to them. It is envisaged that the computer writing program will be used most effectively in collaborative learning situations by students working with peers and teachers in the school environment and/or parents at home. The computer's role is not to replace the classroom teacher or peers but most effectively implemented, it should complement or enhance the regular activities of the classroom.

In this program, as students embark on the safari (refer to the map in Appendix A), they read a range of texts in context, such as letters to penfriends and parents, notes, lists, news items. They are encouraged to move away from the computer at times to discuss the writing with the teacher or peers, read related maps, advertisements or brochures, fill in forms, or take notes and write letters in an off-screen diary. The computer program provides the context, structure, language models, and stimulus for reading, writing, and discussion but is not an isolated classroom resource. The role of the teacher is important in integrating the reading and writing in the computer program into classroom activities.

The program provides contextual graphic support for genres with photos, diagrams, illustrations, and techniques of animation which move and invigorate text. As the development program for Writing Safari is **HyperCard** for the Macintosh, using **HyperCard**'s browsing and linking facility, "hot buttons", graphics, and animations should allow learners to enjoy exploring texts. "Techniques such as clicking and dragging to rearrange texts can be exploited to enrich presentation and stimulate interaction and learning'" (McCarthy 1993, 5). "Help screens," hidden reference notes and visuals, the "writer's toolkit" and other resources can be called up to provide more individualization and allow the learner to exercise control. The navigation icons and language exploration icons (Toolkit and Notebook) at the bottom of the screen are user friendly and allow learners to be self-paced (refer to Appendix A).

Deaf upper-primary school students trialling the program commented positively on the enjoyment and learning value of the realistic trip context, personalized on-screen notebook, and pop-up graphics (scanned photos, postcards, images) which explain difficult vocabulary. Different students clicked on different hot-spot words and branched to different cards that were of interest and use to them. The computer therefore provides learners with a "patient tool" to allow for individual differences in interacting with the program.

The same students commented on the motivational value of instant personalized feedback for choices which indicated right or wrong, clues for learners to try again, or provided explanations to confirm or disconfirm choices.

Students can write in their on-screen notebook accessed by selecting the notebook button from the bottom navigation bar on the screen, compare their attempts (drafts) with computer genre models and checklists, and use word-processing editing facilities to manipulate their own texts less arduously with computer tools than with pen and paper. A parallel off-screen diary with writing activities is available so students have a hard copy for note taking and discussions away from the computer.

The Toolkit, accessed by selecting the magnifying glass icon on the navigation bar, allows learners to explore different aspects of genre in different texts as if using a magnifying glass (refer to Appendix B). The learner starts the exploration from a "top-down" perspective focussing on genre organization. The first tool in the toolkit (genre) allows learners to identify a text's genre e.g., narrative, recount, report or persuasion, and to learn how and why texts are constructed the way they are. Other toolkit tools or buttons highlight generic structure e.g., how reports and recounts are organized differently. The toolkit buttons focus on genre specific clause level organization, cohesive features, vocabulary choices, and punctuation. The purpose is to raise learners' awareness of discourse level aspects of writing as primary

concerns while the "Danger Zone" tool can be accessed for pointing out, at the syntactic level, common pitfalls in deaf writing and modelling of the editing process to assist learners to develop strategies to edit their own writing.

By concentrating on presenting contextualised models and using the exploratory tools to raise learner awareness of audience, purpose, genre organization and conventions as primary concerns and syntactic choices related to meaning as secondary, then it is hypothesized that learners might move beyond a sentence-level view of writing to consider writing as communication and something over which they can exercise control.

The multiple roles of the computer as a stimulus for discussion, as a visual means of setting the context, as a medium for presenting models and tools for analysis and comparison and as a guide were important considerations in the design of the program.

The role adopted for the computer by "Writing Safari" reflects a model Mohan (1992, 121) calls, "the computer as context for cognitive language development." In this model, Mohan sees importance being placed on "the context of communication" with the computer as "an important source of contextual support to aid language learners."

Mohan (121) quotes Cummins (1984) whose studies in second language learning and bilingualism focus on communicative "context-embedded" tasks requiring "active cognitive involvement" by the learners. According to Cummins, a second language learner may fail in school when faced with tasks which are both cognitively demanding and context-reduced and therefore difficult to understand. He holds that the more instruction can initially be context-embedded, the more successful it is ultimately likely to be in developing cognitive-academic language proficiency. Writing Safari reflects the approaches of Cummins and Mohan's computer model.

CONCLUSION

Writing Safari aims to provide contextual support in the form of presenting language within the context of a trip which involves learners in writing for real purposes to real audiences. The interface of "friendly" icons, visual support in background screens, scanned realistic illustrations, and photos have been included to contextualize language and reinforce that writing is a meaningful social activity.

The tasks and computer tools in the program aim to encourage learners to be more actively engaged in thinking about language choices and how to construct appropriate texts that are socially purposeful, and how to look for ways of improving and editing their own writing according to the models and "scaffolding" given.

It provides a step towards more learner independence and control which will not happen immediately with one computer program. It needs teachers to use the principles of language learning and methodology espoused in this program to revise their views of language learning and learner capability and to allow deaf students to be challenged beyond their present level of competence.

With due attention to the above factors we hope to make a significant contribution to the development of deaf writing.

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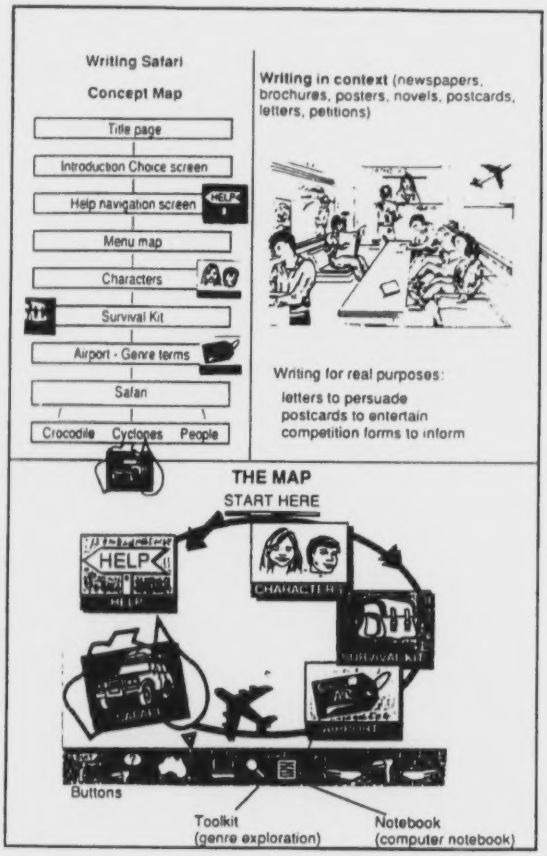
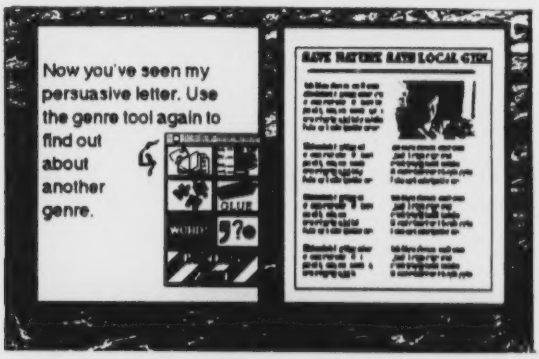
APPENDIX A



APPENDIX B

The Survival Toolkit enables learners to explore different genres according to schematic and textual features. It includes a "Danger Zone" tool to highlight common deaf writing difficulties.



BEST COPY AVAILABLE

THE SILENCE OF THE LAMPS: ON RESUSCITATING AND RE-DESIGNING THE LANGUAGE LAB LEARNING ENVIRONMENT

MICHAEL FAßBENDER

ABSTRACT

Language lab design still bears the hallmark of the sputnik years; a simple box pattern, however, no longer meets the requirements of learning, and the interior design is scarcely stimulating. Modern hard-and software often resides in a makeshift, inconvenient setting.

The lab's basic functions, however, will soon be available elsewhere, due to miniaturization and mobility of equipment, growing networks, and the advantages of wireless communications. The traditional lab will be challenged. An analysis of the shortcomings and health hazards of today's labs and an evaluation of frequently neglected factors is given. Integrated planning concepts for a new modular lab environment are presented, followed by an outlook into the lab's future.

INTRODUCTION

Even the best software turns repellent when the user has to squat in front of a box crammed with equipment, annoyed by air draft, and humming sounds from fixtures and fans, his vision impaired by glare. In a nutshell, numbers of language labs deserve a door sign saying, "We apologize for the inconvenience!" The point is that the interface doesn't end at the screen, but encompasses the surroundings of the workstation, too.

If the user is discomforted, however, he will perform poorly; his acceptance of the language lab will remain at low level, and he will hardly develop interest in the manifold possibilities of the software (Dainoff 1987, Oborne 1985, Johnston 1984), because he can't enjoy what he's doing. In times where we expect computer sessions to increase in frequency and length, ergonomic negligence will prompt rejection or may cause health problems in users. But they want something fun and healthy. So let's be preventive, let's provide for adequate equipment that will accompany our users well into the coming millennium.

To refute a widely held belief – any "ideal" size or arrangement of furniture is a myth, and the "average user" is a phantom. Consequently, the equipment has to be versatile. The magic word is adjustability. Fixed installations do harm to those "too" big, "too" small, or "too" tall, and students using language labs normally are of an age where it is crucial to pay attention to their growing bodies. Neck and shoulder pressure pain comes quickly when working at an improperly adjusted computer (Kroemer 1988). We should therefore aim at a neutral alignment of the spine, with the monitor placed at eye-height (Figure 1). The ideal distance

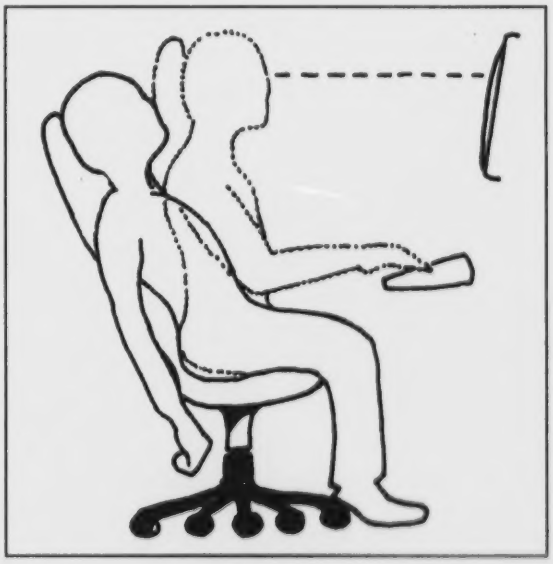


Figure 1.

between the screen and the eyes varies individually. Not only eyeglass wearers will appreciate a screen that may shift back and forth.

THE MODULAR APPROACH

All furniture must be stable. Working on it or leaning against it must not make the piece shiver. For safety and health reasons, any heavy furniture in the lab should be moveable on wheels. Depressed in the floor, there must be anchor points to secure wheeled equipment against tipping by means of quick-fix anchor hooks (Figure 2).[1]

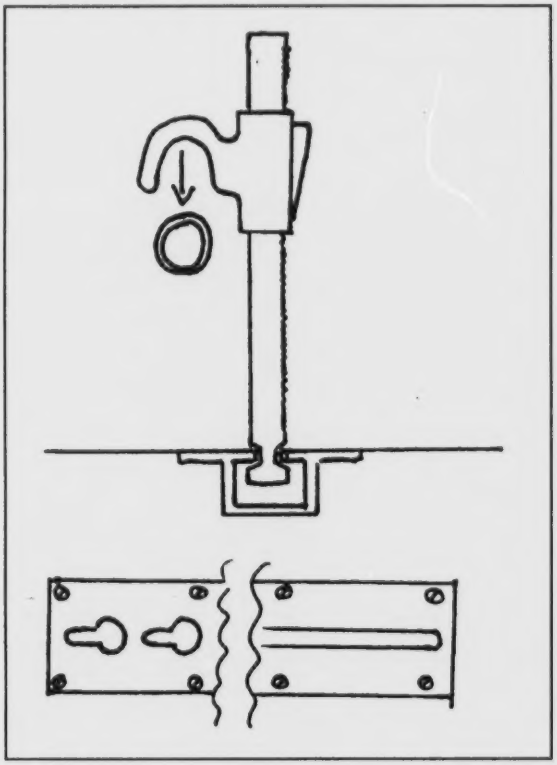


Figure 2.

This way, parts of the lab may be furnished temporarily with mobile equipment in the sense of a modular lab, or MODULAB©, other space can be assigned permanently to certain functions. The idea behind it is to devise modules which serve different purposes and may be rearranged according to educational needs in a matter of minutes. The basic units to be presented here are dividers, flat-top tables, and computer stands. They are fully adjustable and display the necessary safety features like cable raceways and cantilevered surfaces (see Figure 3 for detailed description).

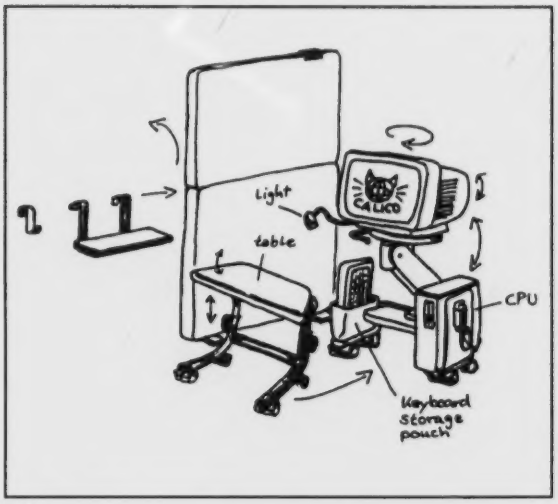


Figure 3.

Miniaturization and flat screens will soon allow input devices and displays to be mounted on light-duty arms and platforms resembling those used by dentists (Figure 4).

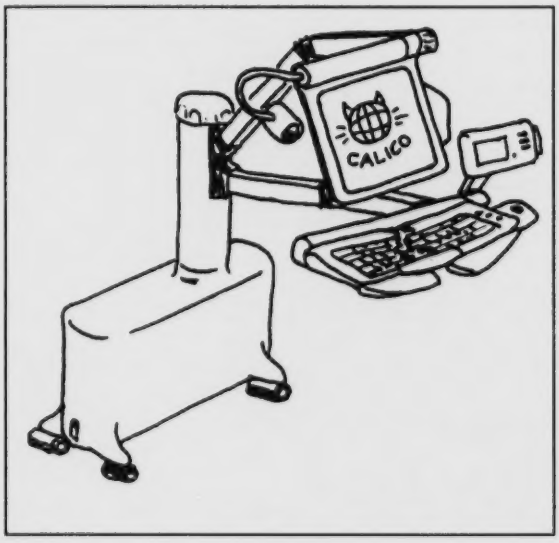


Figure 4.

The modular approach is far removed from the old boxes-in-a-row pattern: the boxes were designed for use by single students – the benefits of synergistically acting and learning groups have long been known (Meunier-Cinko 1993, Chang and Flint Smith 1991, Paramskas 1986, Gilgen 1986), and have eventually been acknowledged in workplace design. Modular carrels permit pairs or groups of three to cooperate around one computer (Figure 5), for larger groups you simply take the dividers away and arrange the stands and tables e.g. in star-shaped patterns (Figure 5). Power and network access is supplied by depressed-access socket and outlet units in the floor.

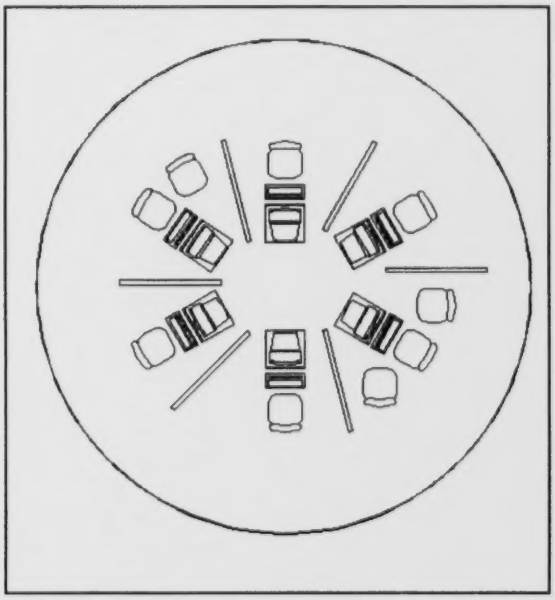


Figure 5.

Traditional boxes for single users may still be mounted along some walls, should however leave ample space in the middle of the rooms for tailored arrangements. In so doing, one enhances the lab's functional efficacy. The lab does not necessarily have to be one large room but, adjacent to the main room, it should comprise a suite of smaller compartments to accommodate screenings, multimedia presentations, group tutoring, or be opened to individual users. Even the large main room should be separable by full-height dividers into a number of smaller units (Figure 6).

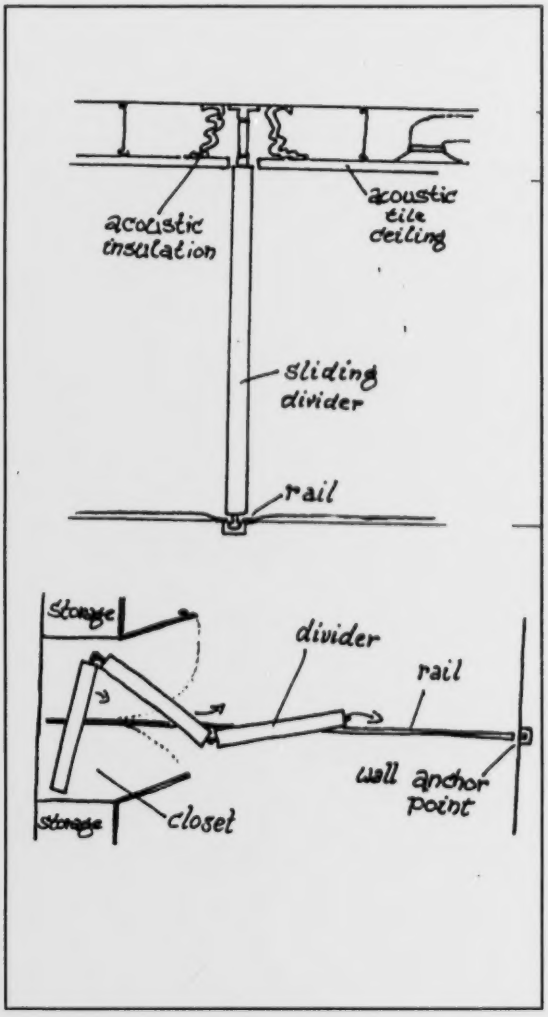


Figure 6.

Progress in technology demands flexible space solutions. Networking, for instance, will bring file servers into the lab. And what will Virtual Reality bring? Versatile storage space of any kind should always be planned on large scale to match future requirements.

A concept of variable arrangements like this calls for an elaborate adjunct system of accessways, circulation spaces, signs, and icons clearly indicating the function of the different sections of the lab, thus reducing disturbance.

CHAIRS AND THE SEATED POSITION

People feel most comfortable in the posture automatically assumed when floating under water or hovering in space (Figure 7, cf. Kroemer 1988).

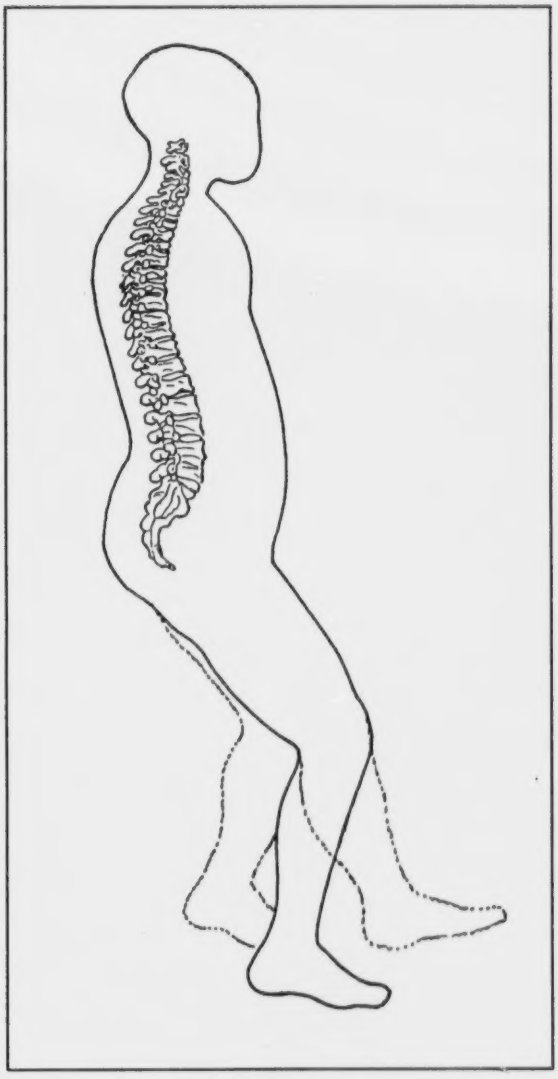


Figure 7.

Chairs should allow us to approximate this posture and provide ample support for trunk and thighs, the upholstery absorbing pressure on body tissue to prevent irritation and ischemia. An array of adjustable chair models is available with office suppliers. Mounted safely on a five-wheel caster base, chairs come with arm rests, anatomically molded seat pans, and properly formed, forward- and backward-tilting back rests that, adjustable in height, support trunk and neck, and have a supportive lumbar protrusion. All levers and knobs must be within easy reach of the user sitting on the chair. The covering should be made of sturdy cloth or leather, but never of plastic; cloth always feels more comfortable than plastic (Rohles and Krohn 1982).

For a fully adjustable workstation, a foot rest is not needed, with a fixed table height, or with very small users, it is thoughtful to have some available on request.

The future of adjustability is already present in some cars. One enters a code into the on-board computer, and everything from seat to air to steering wheel is immediately adjusted according to the information stored about you. As soon as this is available in the language lab, it could be triggered wirelessly, or by a card reader for user identification at the chair. For the time being, users have to be trained in handling their workstation's equipment, and kept posted about changes and novelties.

A grain of prevention is worth pounds of cure. That's why we should encourage users to take a break for their health once in a while. With the support of your physical education department, post flyers that recommend and depict a few simple exercises to relax strained muscles, countervail fatigue, and enhance blood circulation in the legs (examples in Sauter, 1985). Get the lab staff trained to assist users with these exercises. A suggestion is to integrate features into your software that propagate these exercises.

ARCHITECTURE AND BASIC INTERIOR DESIGN

As for the furniture, stability of the building is an important factor, too; vibrations or floor slab oscillations caused by walking people or disturbances outside the building can interfere with the operation of spinning data storage devices, or annoy users. The floor should be carpeted with a sturdy, wheelchair-proof, permanently anti-static matting that does not contain PVC which, besides having other disadvantages, releases potentially toxic gas during a part of its life. In a large room, differently colored carpet may indicate differently designated zones.

A good carpet also enhances the acoustic quality of a room. Every possible surface, including the furniture, should be sound-absorbing. Panels on the walls must be perforated, partitions covered with cloth or carpet, and an acoustic tile ceiling installed. Plants, apart from being pleasant, are also acoustic enhancers, and should not be missing in any lab (Laviana 1983); other "outdoorsy," natural materials may add to quality of acoustics as well as aesthetic appeal.

Decoration is always a question of individual style and taste. It should be aesthetically acceptable for all users, and reflect the purpose of the premises.

THE CLIMATE

Temperature and humidity control contribute to comfort and help prevent static discharges that could harm operators and electronic equipment. In an environment with many electrostatic fields, keeping dust at bay is another major task for the AC appliances. A separate filter unit for the lab may be necessary. For special closets housing heat-sensible equipment, provide for additional AC capacity; problems in this area are usually terribly resistant to attempted post-hoc solutions. It is self-evident that AC ducts should be acoustically insulated.

Interesting work is currently done by neuroscientists who found out that certain fragrances have a positive effect on the performance of individuals in test situations. Whether that finding is of any importance in the creation of learning environments, has not yet been determined. Of course, we should avoid disturbing scents and odors, as they often appear after or during maintenance or repair work. Scenting flowers and plants are fine, as long as their smell is not obtrusive.

THE SILENCE OF THE LAMPS

Every lab should have windows – not only for the sake of lighting: people commonly feel better in rooms with windows than in rooms without (Wise and Wise 1984). Windows, however, must be insulating (thermopane with customized frames), and equipped to screen off bright daylight; else, glare may render the screen unreadable and contribute to visual fatigue. In contrast to horizontal shades, vertical blinds can be better readjusted during the day to deflect incoming sunbeams. To reduce contrast and to comfort the eye, warm, "natural" light pastel colors should be used on all surfaces, with the tones of furniture and floors slightly darker than partitions and walls. The ceiling may be of a matte white.

The lighting system must be designed to minimize glare on the screen. Awkward hoods, or filters mounted on the screen cannot be recommended in a multi-user environment (Tijerina, New York 1984). Illumination in the lab serves three purposes, namely lighting passageways, workplaces, or the whole room during maintenance and cleaning. For the first purpose, indirect lighting is sufficient; the sources can be mounted on the wall or sit as portable units on top of the carrel dividers (Figure 8).

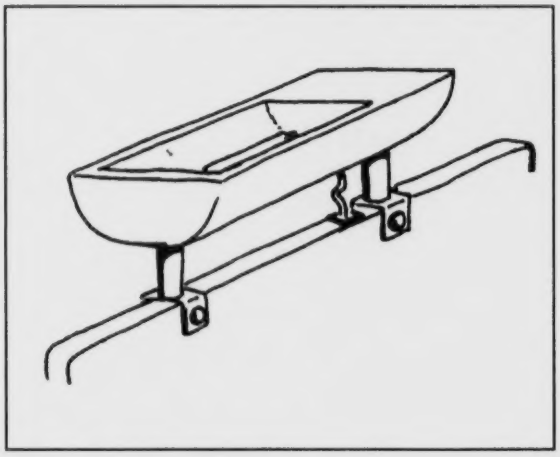


Figure 8.

At the workplace, there should be an adjustable spotlight with a dimmer. Overall brightness needed sporadically can be generated by linear downlights mounted in the ceiling. The flicker of fluorescent tubes might annoyingly interfere with the flicker of the monitors. Ask for special high-frequency fixtures and resort to indirect lighting.

Regular maintenance of the lighting system keeps the luminaires bright and prevents the little appliances in fluorescent tube fixtures from humming. Noise is among the most annoying factors noted by VDT workstation operators (Oborne 1985). Therefore, we cherish the silence of the lamps.

WHAT DO WE HAVE TO EXPECT?

In a world of flourishing use of electronic devices and the oncoming electronic superhighway, along with an increasing demand for language instruction in the *Global Kids* generation that will soon be crowding our colleges, the language lab should be as vital in the future, one should think, as it is today, thanks to multimedia applications like **SCOLA**.[2] There are, however, three important trends in educational electronics that will endanger the traditional concept of the language lab.

The first trend is increased mobility and compatibility of electronic equipment due to miniaturization and improved portable power supply. Within a few years, faculty, staff, and students will be issued by their schools small combined interactive TV/phone-fax/computing units as their basic, versatile professional tool.

The second trend is increasing network implementation, reaching out into virtually every room on campus short of the janitors' closets. With increased availability of distributed network environments, students and faculty will be capable of exchanging essays, assignments, and comments, or use any remote "resource" wherever they are. To name just two, Duke and Harvard have already implemented "paperless classrooms" (Zimering 1993, Harvard Magazine 1994).

As a third trend, we can identify a tendency towards wireless communication. The ability to network without actually plugging in will further enhance mobility. On a cellular campus, with additional sockets and opto couplings, students may do their CALL wherever they want to and turn in the results to their professors' accounts by just beaming a message to the nearest infrared sensor available. For the use of applications demanding larger quantities of data storage capacity, they probably may still have to plug in to access the servers on the campus network. Students will be, however, absolutely free in their choice of where to learn, and no longer depend on certain facilities.

The language learning center, however, could still strongly appeal to a large clientele. More than any other facility at a university or school, it is suited to be a hub of electronic learning and counseling. It could be appealing as a comfortable electronic adventure emporium, a retreat where students can relax while navigating the language and culture discovery environment (Rowe 1991). The technology is there, the space is there, the know-how is there, and the experienced people are there. Libraries, where one already can find carrels for electronic learning, language learning centers, the school's computing assistance and interior designers are natural allies who have to start working more closely together to get their institution prepared and ready for tomorrow's world of interactive, mobile Infotainment.

NOTES

[1] Of course, this equipment comes from the field of emergency medicine and is used to secure cots and the like in ambulances, helicopters, and airplanes. One supplier is FERNO Washington. Ask your local EMS for a demonstration.

[2] Notably, foreign language short-wave radio programs have always been receivable on the continent, but they seem to be a bit unattractive in our HiFi and visual era. Only now satellite radio services will probably improve quality and make audio programs more popular.

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INSTRUCTIONAL AND PEDAGOGICAL CONGRUENCY IN CALL/IAV

ROBERT FISCHER

ABSTRACT

The presenter addresses several aspects of instructional and pedagogical design of CALL/IAV courseware. If CALL/IAV programs are to be effective instruments to improve student learning, it is clear that they should take relevant methodological principles into account. Most CALL/IAV developers devote considerable attention to the appearance and screen layout of programs but may lose sight of their instructional purpose and thus overlook the importance of learner assistance features. Congruence between instructional objectives and pedagogical design features should of course be the fundamental concern in CALL/IAV courseware development. The design of student help features should follow directly from the instructional goals of the CALL/IAV program and accommodate students' learning needs.

The presenter discusses the relationship between instructional objectives an pedagogical design issues and their implementation within CALL/IAV courseware. He will detail the ways in which pedagogical considerations impact students' ability to attain the goals of foreign language listening comprehension and reading comprehension in CALL/IAV programs. He will demonstrate how the successful integration of appropriate pedagogical design features with specific instructional goals creates a rich and effective learning environment. He will then sketch a model of CALL/IAV courseware which reflects the principles and practices of a unified instructional approach to foreign language acquisition.

PRESENTER'S BIODATA

Robert Fischer is Professor French and Linguistics at Southwest Texas State University. His primary research interests lie in Applied Linguistics and CALL/IAV design issues.

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SUPERMACLANG

OTMAR K. E. FOELSCHE

ABSTRACT

Three years ago, the Consortium for Language Teaching and Learning provided funding for updating Judy Frommer's program **MacLang**. System development at Apple Computer, Inc., the availability of **WorldScript**, and the appearance of digitized media provided opportunities which did not exist at the time when **MacLang** was first created. The decision was made to reprogram the application completely rather than to update existing code.

SuperMacLang (SML) is an environment for contextualized language activities. The environment presently provides for construction of fill-ins, column matching, jumbles, and multiple choice activities. All activities can be connected to all types of media to be presented in appropriate contexts. Users have various degrees of access to the environment. In "practice mode," for example, users can try activities as many times as they want, see the answer, starting and ending wherever they want. In "homework mode," users may be restricted to a specific number of tries and may not be allowed to see the answer. In "test mode," the restrictions can be very severe, forcing users to go through an activity according to the author's direction. **SuperMacLang** is fully compatible with System 7.1 **WorldScript** and can handle most languages, including Japanese and Chinese.

Additional capabilities of the program include alternate correct answers, anticipated incorrect answers, and access to grammars, glossaries, and dictionaries. The program also tracks the user's work, producing a text file that can be submitted via a network.

SuperMacLang is fully compatible with dictionaries, glossaries, and text presently in use in Dartmouth's **annotext** environment.

ACKNOWLEDGMENT

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PRESENTER'S BIODATA

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EXITO – FROM SURFACE TO DEEP STRUCTURE

NINA GARRETT

ABSTRACT

This workshop examines the design and results of *EXITO* (Spanish for "success"), an interactive video program for teaching survival Spanish. At the Language Training Division and at the Federal Language Training Laboratory, *EXITO* has been in use for several years now, although fuller tracking of its results has occurred mainly in the last year or so.

As an introductory survival language program, *EXITO* can be used at one's own pace in one's own time or in a more structured setting where 10 working days are allotted to its completion. In this second context, *EXITO* can be augmented by classroom teachers who give *EXITO* students the chance to participate in spontaneous, communicative interchanges based on the units of *EXITO*. This augmented model has proven particularly fruitful and led to higher exit oral proficiency interviews (OPIs).

Participant background and reactions have been documented in both pre- and post-*EXITO* questionnaires and their proficiency results measured on the U.S. Government's ILR Speaking scale by means of exit OPIs. What do they reveal? Moreover, basic to the results is the design of *EXITO*. What does it do? How does it do it? How successful is it? And how do we know? What data does it collect on learners' interactions with the program? What does this tracking tell us? Moreover, what else would we like to know in order to render such programs even more useful? These are the questions we will be exploring in this paper and discussing with the CALICO audience.

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Nina Garrett has a Ph.D. in Second Language Acquisition and Teacher Education from the University of Illinois. She has taught German and French at secondary and postsecondary levels, as well as graduate courses on second language acquisition theory, language pedagogy, and language technology. She was Research Associate at Illinois and Visiting Associate Professor at Carnegie Mellon and Cornell before becoming Associate Professor at George Mason and Academic Affairs Coordinator at the Center for the Advancement of Language Learning (CALL). She currently chairs CALICO's Executive Board and is on several national advisory boards. She teaches, publishes, and consults on the integration of SLA theory, FL teaching, and technology.

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CALICO LUNCHEON PRESENTATION: COMPUTER INTERFACE DESIGN GUIDELINES

SALLIE GORDON

BASIC DESIGN GUIDELINES

[Excerpted from S. Gordon, *Systematic Training Program Design: Maximizing Effectiveness and Minimizing Liability*. Prentice Hall, 1994]

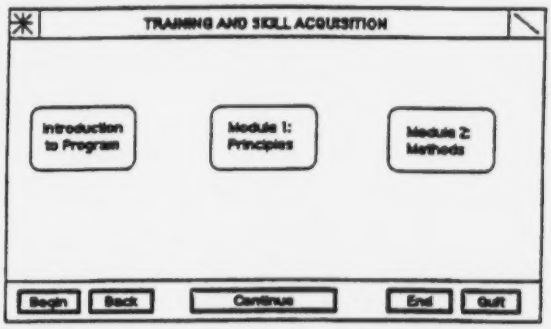
There are entire volumes written on human-computer interface design (e.g., Helander 1988), and we can't cover all of that material here. I would strongly suggest that those who aspire to CAI production read and take courses in that area. In the meantime, we can review the major or most important goals, principles, and guidelines in designing CAI systems. The first goal that designers should always keep in mind is:

Create a system that is easy for the learner to use.

While this goal is important for software design in general, it is especially critical for training and instructional applications. There are two reasons: (1) in most cases, the student is a novice who will not use the program for a long period of time (as does a person using a word processing system, for example); and (2) in instructional applications, cognitive resources need to be devoted to the content and not to trying to find one's way through the instructional courseware. For these reasons, the instructional designer must focus on developing a system that is simple and straightforward in its use.

What characteristics make things "easy" for a novice user? At any given point, users should understand what is being presented, what they are required to do or have the option of doing, and how to accomplish their current goal. The system should also display what the system is currently doing, if anything (e.g. an hourglass when the system is working and the user must wait).

As an example, at any given screen, the user may want to end the session. This is a "current goal." The action required to do this should be apparent. Now consider the screen shown below. It is not entirely apparent what the user must do to end the session. Does one click on the button marked "End" or on the button marked "Quit"? Also, the three areas in the center are "hot" in that the user clicks on them to start a tutorial. Thus, the screen doesn't meet the requirements of the user knowing what the options are, and how to carry them out.



Sometimes designers will try to sidestep the problem of usability by including icons whose meaning is obscure, and then relying on "instruction" regarding how to use the system. This instruction tells users the meaning of the icons, as well as how to get around in the system. However, this is a particularly bad design philosophy and should be avoided whenever possible. One reason is that learners dislike using the "how to use this program" function, and will frequently ignore that portion of a CAI program. In addition, the approach of training the learner how to interact with the system places an extra burden on user memory (they have to remember all of the concepts and rules), and takes cognitive resources away from the primary task. Not to mention the fact that it is frustrating for the user if they fail to remember the information.

In summary, the primary goal for designing the interface is to make sure that the system allows users to easily understand how to interact with that system. This is done through clear and concise messages, and buttons or other input devices that also have clear and concise meanings. This type of design

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requires patience, creativity, and most of all *user testing*. In the sections below, we will review other more specific design guidelines.

STATIC SCREEN DESIGN

Many of the guidelines offered in the document design section will also be relevant to computer screen design. In addition, there are several suggestions that pertain to each individual screen. Readers are strongly encouraged to consult Mayhew's 1992 book, *Principles and Guidelines in Software User Interface Design*, for specific and useful guidelines.

- **Don't try to place too much information on the screen.** As a general rule of thumb, Tullis (1983) suggests that, based on research, the alphanumeric characters shouldn't take up more than 25-30% of the total screen space. This is equivalent to leaving plenty of white space in written documents. Include *only* information that is really necessary.
- Even when trying to keep the screens uncluttered, be sure to **include *all* information that is necessary.**
- **Group characters** so that they are moderately (but not extremely) packed (Cakir, Hart, and Stewart 1980).
- **The items on a screen should be logically grouped** so that people perceive the screen as consisting of blocks of related pieces of information. Groupings of items often consist of *functional* groupings. An example is where all buttons to move from screen to screen are grouped together, all buttons to edit are grouped together, etc.
- **Leave adequate space around each group** (Jones 1978; Treisman 1982).
- In addition, **a smaller number of groups is better than** a larger number of individual items or a large number of groups (Tullis 1983).
- **Minimize the complexity of the layout.**
- **Maximize visual predictability.** Put another way, "based on a knowledge of the location of some items on the screen, one should be able to predict the locations of others" (Tullis 1983).
- **Use redundant coding.** That is, have two or more different variables providing the same information. For example, active buttons could always be shown as "shadowed rectangles" and also always be colored turquoise blue.
- **Use symbols or icons for input buttons that are consistent with learners' previous knowledge.** For example, a question mark is relatively well known as a symbol for requesting help or information.
- **Strive to use words *and* icons.** The best icon is one that passes "predictive" user testing. That is, the function of an icon, when it first appears on a screen, should be predictable by a novice user. If you ask "what happens when you click on this icon?", the user should be able to accurately tell you.
- **Do not use hidden buttons** (where parts of the screen are active hot spots, but you can't tell by visual inspection). Exceptions are when (a) all parts of the screen are hot, as in a map or picture with parts acting as hot buttons, and users know this; or (b) the cursor symbol changes when it is over buttons, giving visual feedback that the area is hot. In most circumstances, **start in the upper left-hand corner of the screen,** as this is where people habitually begin search and reading.
- **Use upper and lower case for text.** Use minimal or no text that is all upper case (Tullis 1988).
- Blinking is a very strong visual cue and can be distracting. **Use only in emergencies or critical situations.**
- **Use reverse video sparingly.** Appropriate uses would include indications that an item has been selected, or to indicate an error field (Mayhew 1992).
- **Messages should be brief, concise, specific, helpful, and comprehensible.** The following graphic contains examples of poor and improved messages from Mayhew (1992):

POOR:	*IMPROVED:*
1. The processing of the text editor yielded 23 pages of output	Output 23 pages
2. Cannot exit before saving	Save file before exiting
3. Bad/illegal/invalid file name	Maximum file name length is 8 characters

- **Use instructional prompts** to cue users when they must type or perform other necessary input activity (see Mayhew 1992, for guidelines).

USE OF COLOR

Based on empirical research, Mayhew (1992) suggests using color sparingly. Some of the more important guidelines follow:

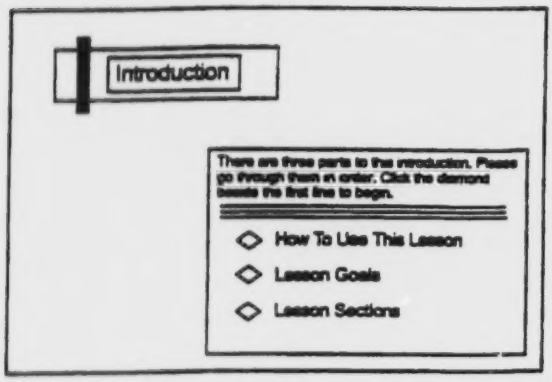
- **Do not use bright colors such as red, yellow, pink, orange for large areas.** Use only in small amounts to gain users' attention.
- **Do not use too many colors on a screen,** unless it is a full photo or video image type of situation. Sanders and McCormick (1987) summarize the suggested limit as being nine colors.
- **Use color coding and be consistent in color use.** For example, if light blue is used for video control buttons in one part of a CAI program, they should be used consistently throughout.
- **Limit the color coding** (where color has a specific meaning) to eight distinct colors (Mayhew 1992).
- **Use colors to draw attention, communicate, or organize information.** Showing certain types of information in a particular color can help users search for and identify information. Similarly, avoid using color in "non-task-related" ways. This will only make things more difficult and distracting for the user.
- **Do not use color images or text on color background.** Use colors on achromatic backgrounds such as black, gray, white. Or use achromatic images on color background.
- **Avoid using bright blue for text or small, thin-lined graphics.** We are not good at distinguishing blue objects from their background, and our eyesight for blue decreases with age (Murch 1987).
- **Avoid the combined use of opposing colors, highly saturated colors, or colors far apart on the color spectrum.** This applies within one screen as well as across screens. Determine the uses of color for your specific application, write the information as a style guide (job aid), and **follow the style guideline rigorously.**

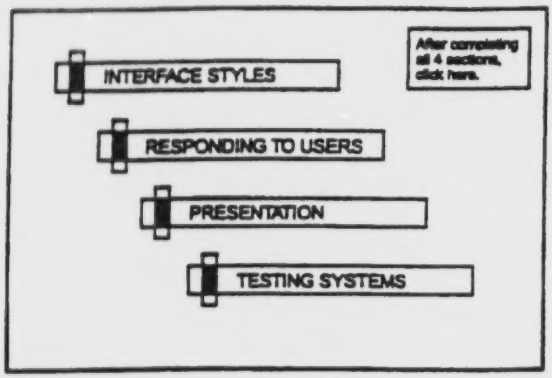
Designing for Interaction

When a user sits down to interact with an instructional computer system, it should exhibit a quality known as **transparency.** That is, at least two things should be relatively apparent to the user: the general nature of the program (what it is used for), and how to interact with the program. In keeping with the second goal, the user should know how to accomplish goals, whether they are vague (I'm totally lost on this topic, can you help me?) or very specific (I want to quit for lunch).

In addition to these general principles of interface design, designers should attempt to follow certain basic guidelines for developing instructional systems. Some are given below.

- At the beginning, **present an overview of how the system works and how the learner interacts with the system.** This may be explicit information or implicit in the screen design.
- **Provide an advance organizer.** This can be something as simple as a list of topics, or a map of the program that *clearly* conveys the contents.
- **Make use of previously existing knowledge.** This can range from using icons such as a "?" to using an entire metaphor. Some metaphors that have been used in software include the desktop (calendars, appointment books, etc.), a schoolhouse metaphor, or a city. Most users are now familiar with touching a place on the screen or clicking on buttons with a mouse, so these are good input mechanisms. A variety of symbols may also be familiar, depending on the target population. For example, VCR and cassette recorders often use variations of arrows for play, record, reverse, etc.
- **In general, a graphical interface will be better than command language input** for training programs. As always, a designer must match the complexity, input mechanisms, and symbology of a system to the trainee population and task characteristics.
- **Use consistent design elements from one screen to the next.** This includes color coding for functions, placement of control buttons, use of symbols for icons, etc. The next figure shows an example of a CAI system that does not follow this principle. In the first sceen, the user clicks on diamond shaped buttons (not apparent buttons), and on subsequent screens the user must click on rectangular topic boxes (also not apparent). Color coding was not used in either case.


Introduction
There are three parts to this introduction. Please go through them in order. Click the diamond beside the first line to begin.
How To Use This Lesson
Lesson Goals
Lesson Sections



- For most hypertext or hypermedia systems, **make the underlying organizational structure hierarchical** rather than an unstructured network of nodes (Gordon and Lewis 1992).

In summary, a design team must create a simple and obvious system for the user interface, and stick to that system consistently throughout the instructional program. This doesn't mean that the instructional program has to be simple or plain, but it should have a structure and interface that users can understand easily and use without difficulty.

Designing a user-friendly system requires effort and creativity. And, even with those characteristics, at some point it becomes virtually impossible for a designer to see the system from the eyes of a novice learner. This is why the prototyping and user testing phases are especially critical for the development of CAI instructional programs. Nothing else can replace this step, not even asking other designers to judge your program.

HOW TO PERFORM USER TESTING

[Excerpted from S. Gordon, *Systematic Training Program Design: Maximizing Effectiveness and Minimizing Liability*, Prentice Hall, 1994]

As early as possible, the analyst needs to get feedback on the project. In the traditional instructional design model this process has been termed **formative evaluation**. In formative evaluation, one seeks the opinion and approval of supervisors, project leads, team members who may not have been directly involved to that point, subject matter experts, and peer instructional designers. While this process is important, there is another process which has historically not been given enough emphasis, **user testing**. User testing is the process of asking people who are representative of the ultimate trainee population to view and "use" a prototype of the instructional or performance support system and provide feedback of various kinds.

User testing consists of asking representative learners or trainees to interact with the prototype; where the term "interact" is used in the broadest sense. Learners may be asked for a general opinion about whether they like the program, they may be tested for comprehension of the text, they may be asked to use the program to determine its usability, and so forth. There are a variety of reasons why we perform user testing, and all of them revolve around the different types of questions we are asking. These questions include:

- What is the learner's attitude toward the training program?
- What is the usability level of the program?
- Does the person learn from the program?
- Does the program affect the learner's attitude about the subject?

The particular questions of concern to the designer will determine how user testing is conducted and what variables will be measured.

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VARIABLES MEASURED IN USER TESTING

Based on the questions just outlined, we can categorize the variables to be measured in user testing as follows:

1. **Attitude toward the training program.** The first variable is the reaction of learners to the specific instructional design we have selected. A person's attitude toward the training program will operate on different levels. That is, they will react anywhere from very negatively to very positively toward the general approach. For example, do they like the idea of a workshop, or a self-paced CAI program? The attitude will also operate at a more specific level. They may like the program in general, but have mixed reactions to specific components of the program. Both of these levels should be measured. The most common method for measuring general attitude toward the program is to simply ask the learners. Questionnaire items can be open-ended, or more likely, a rating scale such as a seven-point Likert type of scale. Trainees can also be asked to rate each component of the program.

2. **Usability of the instructional program or support system.** For products such as documents, on-line help systems, and especially CAI usability testing will be important. There are many ways to measure the usability of a system. The most common are to ask for a subjective opinion, and to measure performance of a person using the system. Table 1 gives some examples of variables that can be measured to assess system usability (many of which were previously listed by Whiteside, Bennett, and Holtzblatt 1988). All of the method categories in Table 1 have been used by numerous researchers. As far as which methods provide the most information for analysts, recent empirical evaluation showed that think-aloud protocols and performance measures were both effective, however, think-aloud protocols were more sensitive, providing a broader array of underlying problems (Virzi, Sorce, and Herbert 1993).

The list of variables in Table 1 should give the designer a good start on assessing system usability. Readers are also referred to outside resources such as Whiteside et al. (1988); Coleman, Williges, and Wixon (1985); and Meister (1987). Computer based instructional systems and job aids generally require much more extensive user testing for *usability* than do other types of programs. In a later section, we will discuss some simple prototyping and user testing methods for each type of instructional system.

Ask Learner After Interaction How Easy the System Was to Use

- Open-ended questions
- Rating scales (see Coleman et al. 1985)
- Focus groups
- List good and bad features (measure number of positive and negative features recalled)

Measure Errors Committed in Using the Instructional System

- Frequency of errors
- Type of errors
- Percentage of errors
- Severity of errors
- Relative time spent in errors

Note Verbal Expressions During Performance

- Number of times learner expresses difficulty or dissatisfaction
- Think-aloud verbal protocols, where learners work alone or in pairs
- Answers to question probes administered during system use

Measure Performance on Tasks (Mostly for Performance Support Systems and Documents)

- Number of tasks accomplished
- Time to complete task(s)
- Percentage of task(s) completed
- Percentage of task(s) completed per unit of time
- Ratio of successes to failures
- Number of repetitions of failed commands
- Number of times needed help from outside source

Table 1. Methods for Assessing Instructional System Usability

3. Comprehension, retention, and transfer. It is sometimes useful to determine early in the design and development phase whether the training program is going to be effective in terms of instructional goals. That is, does it promote comprehension, retention, and use/transfer of the information? Assessment of these factors can be done both early and late in the design and development phase. These factors can be tested early by developing and testing a *subset* of the learning modules. For example, if an instructor were writing a text, he or she could test comprehension and retention for representative sections. Measures of retention and use/transfer can be developed on the basis of instructional goals and objectives.

Often, questions of learning and retention are left until after the system has been completely developed. However, this is less efficient that performing early prototyping and user testing. Comprehension can be measured by asking learners to read, watch, or listen to instructional materials. They can be asked to verbalize, during or after these sessions, areas where they did not understand, or had questions. The most extensive testing for retention and transfer should be performed after the system has mostly been completed. This is because testing the materials within the context of a fully developed system will provide the most valid data regarding comprehension, retention, and transfer. This final phase of prototyping and user testing should be performed before the system is fielded. Once fielded, additional evaluation will be performed.

4. Attitude toward the subject matter. Some instructional programs will explicitly have as a goal to increase the motivation of the learner with respect to some behavior. For example, a videotape on safe logging procedures might aim to increase the "safety awareness and concern" of loggers. It might also attempt to increase the performance of certain behaviors that are safe methods of accomplishing tasks. It is not enough that the trainees learn the methods shown in the videotape; it is also important that the trainees leave with a positive attitude toward the material taught in the program.

COLLECTING DATA FOR USER TESTING

The most common methods for user testing are interviews, questionnaires, asking the person to use the system by performing benchmark tasks, and monitoring free use of the system. The designer must determine which of these is most appropriate depending on the type of data being collected. For example, to measure learner attitudes (#1 and #4), the most likely data collection method would be a questionnaire or interview. To measure error rates, learners would be asked to perform a variety of benchmark tasks using the system, etc.

Keep in mind that the people who act as trainees during the user testing *should not* be people who are familiar with the instructional system. For example, students or learners working with you on development of the program should *not* be the same people you use to perform the user testing described here. The goal is to collect data about the effect of your instructional system on its final user population. Your learners for user testing should have the *same characteristics* as that final student population, including a lack of knowledge about the instructional system.

USER TESTING FOR CAI

In performing user testing for CAI systems, the designer will probably want to evaluate all of the variables described earlier. It is especially critical that a CAI system have extensive testing in terms of system usability. Recall that one goal of development was that at any given time, learners would know:

- What options are currently available to the user.
- How to achieve their current goal(s).
- The meaning of all information displayed on the screen.
- Whether or not the system is ready for user input.
- What the system is doing (such as waiting, loading files, etc.).
- How much of the system operation has been completed (if it will take a long time).

If the user should know all of these things at any given point in time, that means that s/he should be able to verbalize them. Assessing the extent to which you have accomplished this goal forms the heart of user testing for computer based systems.

Based on this foundation, we can now specify how to conduct user testing. First, for CAI systems you should normally collect data both *during* and *after* use of the system, and the data collection should start early in the design process. When the system is

refined and near completion, user testing can be done exclusively *after* the learner has used the system. Two methods described below are suitable for user testing, think-aloud verbal protocols, and question probes. Each method gets at different information and both should be used during early testing.

To obtain the maximum information from think-aloud protocols, some preliminary training should be provided for users. Otherwise, they may not verbalize enough information. Users can be told that you will give them some tasks to perform, and that you would like them to vocalize all of their thoughts as they use your system. These tasks may be as simple as "looking at the different parts of the instructional system." The information you would like them to say out loud includes:

- Their **goals** (what they are trying to do at the moment),
- What **actions** they think they should do to accomplish those goals,
- Why they are trying those actions,
- The **meaning** of different parts of the screen (buttons, for example).

One way to help users learn to perform think-aloud verbalizations is to model the behavior for them using software that is completely different from that being tested (it doesn't even have to be an instructional system).

When users perform think-aloud verbalization during task performance, they may only state bits and pieces of the types of the information listed in the previous paragraph. To alleviate this problem, you can perform user testing with question probes. Have users begin the same tasks, only this time stop them at various points along the way. When you stop them you can ask any or all of the following questions:

- What is your current goal (what are you trying to accomplish)?
- What action(s) do you think you would have to perform to accomplish the goal?
- What actions or options do you think are available to you right now?
- What do you think would happen if you ____ (e.g., click on the right arrow)?
- If I asked you to ____(goal), how do you think you would do that?

If the system is well designed, users will be able to accurately state the meaning of all of the icons, buttons, and menus the first time they see them, and predict what will happen when they are activated. They will also be able to determine how to accomplish their goals. For example, at any point during the system use, the user should be able to tell you how to quit the system.

After the early testing for usability, we can begin to focus on other issues such as general attitude toward the system, comprehension, retention, and so forth. It doesn't make any sense to begin measuring these variables before you are sure that the system is easy to use. One reason is that learners won't like systems as well if they aren't easy to use, and they will also show poorer learning to the extent that cognitive resources must be devoted to using the interface (Gordon, Gustavel, Moore, and Hankey 1988).

It is difficult for the designer of a CAI system to objectively perform user testing. Designers are so familiar with their system that it is hard for them to understand why a user is having difficulties. In fact, the designer who performs user testing on his/her own system is often completely blind to difficulties experienced by users. They either completely deny the difficulties, or attribute the difficulties to characteristics of the user (they just aren't trying, they didn't read all of the messages I gave them, they didn't read carefully enough, they had a bad attitude, etc.). For this reason, it is often best to have someone else do the user testing.

ETHICS OF USER TESTING

User testing is a form of experimentation using human subjects. As such, certain protocols are appropriate. Readers are encouraged to request a document published by the American Psychological Association detailing the correct procedures for using human subjects in studies. In brief, designers should:

- Explain the nature of the study at the beginning and assure the person that they do not have to participate unless they so desire. Ideally, you should ask the person to read a description of the study and obtain their signature on this "informed consent" form. Do not use deception without approval of an institutional review board (if you have one).

- Treat all subjects with dignity and respect. An example of what *not* to do would be to tell a user, "Gee, I thought that was an easy one.... all 15 of my user group before you figured it out right away."
- Explain that all data will be treated with confidentiality.
- Do not coerce the user into continuing if they become dissatisfied and wish to quit.

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APPLICATION OF INSTRUCTIONAL TRANSACTION THEORY IN PUBLIC EDUCATION: DOES IT WORK FOR LANGUAGE TRAINING?

SCOTT A. HART AND R. KENT WOOD

ABSTRACT

The NEXUS researchers at the Laboratory for the Experimental Study of Instruction (Utah State University) were recently awarded a major grant from the U.S. Department of Education for the design and development of 13 Instructional Transaction "Shells"; and the subsequent delivery of those shells to the schools of the 40 Utah districts.

Transaction theory (M. David Merrill) began from Robert Gagne's five domains of knowledge and has from that identified 13 kinds of instructional "transactions." This theory potentiates greater precision in defining the conditions that must be met in order to maximize the effectiveness of instructional experiences for individual learners. Research on this increasingly popular theory has primarily been focused on computer based training, but it can be applied to instruction using any delivery system.

Transaction "Shells" are best described as intelligent mini-authoring systems. Each shell knows how to best deliver a particular type of instructional experience and will create a computer based instructional program with full hypermedia support, or a printed lesson plan based on the knowledge base information (lesson content) and student performance requirements outlined by the instructor. This software uses a very intuitive user interface for both the learner as well as the instructor. An instructor can immediately begin to author learner instruction without any training or the use of a manual. The final result is that the development time for quality instructional programming can be cut to much less than ten percent of the estimated 200 development hours per hour of delivered instruction.

The presentation that we propose will begin with a demonstration of a few example transactions in Chinese, Arabic, and Spanish representing the Identify, Execute, and Interpret transactions. This will be followed by an example of the authoring process and a discussion of language training *à la* Instructional Transaction Theory.

This software works on **MS-DOS**, Macintosh, and Amiga platforms.

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Scott A. Hart is a doctoral student, instructor, and research Co-Director at Utah State University; a graduate of DLI and recent national first place winner of an educational programming competition.

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A New Model for Government and Industry to Support Language Instruction: The Cooperative Research and Development Agreement (CRDA) Between the U.S. Air Force Academy and HRB-Systems

Lt. Col. Peter J. Heinz, Mr. Stanley A. Bishop, and Lt. Col. Richard L. Sutherland

THE CONCEPT: LANGUAGE LEARNING 2000

The Department of Foreign Languages (DFF) at the United States Air Force Academy (USAFA) has been a pioneer in the use of Level III interactive videodisc (IVD) technology, development, and application. Development efforts began over a decade ago that resulted in the installation of a premier 64-station Language Learning Center (LLC) that currently provides over 26,000 student-hours of IVD instruction in four languages.

The current USAFA templates represent the culmination of the initial proof-of-concept development efforts that maximized the utility of '80s technology. The result is an impressive set of templates that not only provide students with a high level of interactivity, but also incorporate a set of powerful lesson-creation tools. These tools give instructors, many with little computer expertise, the ability to create a 30-minute lesson in less than an hour. The separation of structure and content strategy employed by the USAFA developers resulted in numerous lessons being made available to students in relatively short time.

The extensive IVD experience at USAFA has provided significant evidence, albeit mostly anecdotal, to support the efficacy of second language IVD instruction. A meta-analysis conducted by Fletcher (1990) further supports the use of IVD in Defense Department training in general. His extensive analysis found that "interactive videodisc instruction demonstrated sufficient utility in terms of effectiveness, cost, and acceptance to recommend that it now be routinely considered and used in defense training and education."

The initial development efforts, however, were handicapped by the state-of-the-art of technology in the 1980s. With the development of faster, more powerful processors that allow for the use of 32-bit operating systems, it is now possible to envision and embark upon the development of second-generation IVD templates based on the original USAFA model. With this in mind, DFF formulated and adopted an extensive, ambitious IVD development initiative christened Language Learning 2000 (LL 2000).

LL 2000 is a vision for the future where classroom and IVD activities are closely linked and tightly integrated. It is a vision where IVD material can be delivered directly to the students' in-dorm personal computer; where virtually unlimited cultural, graphic, visual, and sound support (digitized where appropriate) will be available. The plan delineates a systematic approach toward development and implementation of the next-generation IVD environment at USAFA, and will become the foundation for cadet IVD language instruction into the next century. As a result of the LL 2000 plan, the USAFA LLC will be at the threshold of dorm-room presentation, and the facility itself will ultimately become primarily a research, development, and assessment facility.

The LL 2000 plan is to be implemented in two phases. Phase I includes initial advanced-template research, development, and implementation. Using the present USAFA IVD model as a basis, a three tiered template structure is envisioned. Each of the tiers is specifically targeted at different levels of instruction (beginning, intermediate, and advanced) and thus increase in complexity, interactivity, and feedback potential. All three tiers will be completely integrated so that differences are "transparent" to the learner and will (at the very least):

- Incorporate an inherent lesson design flexibility.
- Incorporate a standardized relational database file structure.
- Be usable for both roman and non-roman orthographies (via Unicode).
- Be modular in design; allow for easy modification and enhancement.
- Incorporate feedback and on-line assessment features. Student generated data must be collected and stored (an electronic portfolio) every time he or she logs on. On-line assessment to include multiple-choice, student generated writing samples, digitized speech samples, and free-response reading and listening comprehension measures.
- Provide instructors immediate feedback to be used in lesson planning in order to empower active and dynamic instruction/lesson development.
- Utilize digital audio/video.
- Incorporate speech recognition technology.

The design strategy for the first-tier, beginning-level template, envisions a flexible lesson environment consisting of four main modules. The Preview module provides an overview of the objectives of the material, to include advance organizers and appropriate pre-tests. The Acts/Scenes module allows students to manipulate the overall scene(s) contained in the lesson, or the individual utterances to attain/enhance understanding. The Focus module consists of sub modules that provide instruction, enhance understanding, or explicate idioms, culture, structural material, as appropriate. Finally, the Practice module will give student opportunities to use the material and validate attainment of the objectives. In addition, this module will provide feedback to the instructor and long-term data for analysis.

The second-tier (intermediate level) is centered around HRB Systems' **Language Dynamics** program. This program allows students to fully explore the target language using authentic, academy-award winning movies. The functionalities of the first-tier template will be made available, as appropriate.

The third-tier (advanced level) is envisioned to be a second-language research and exploration tool. This tool will allow students to do research in the target language on any subject they choose fully utilizing databases located both on-site (CD-ROM, hard disk) and off-site via Internet. Using this capability, students will be able to synthesize research reports from data collected by tapping into databases worldwide. This tier will also incorporate authentic assessment and feedback features.

The USAFA has embarked upon this ambitious second-generation development program. Included in the planning is a complete renovation of our current LLC to a state-of-the-art 100-station facility. Dubbed Language Learning Center 2000, this facility will not only deliver the enhanced IVD lessons, but will finally allow us to do on-line research and data collection. Using this facility, DFF will no longer have to rely on anecdotal evidence, but will be able to continuously collect student-generated data that will ultimately help inform development of not only our templates, but the use of multimedia instruction in general. In addition, the facility will allow greater interaction not only with the computer, but interaction among students, instructors, and remote-site participants while working with the IVD material.

Given the experience of our previous in-house development efforts, LL 2000 was envisioned as an on-going effort spanning several years. Phase II of the plan continues the initial effort beyond the three-tier template incorporating new and upcoming technologies such as speech recognition, high-capacity and rapid-access holographic storage, etc.

In the past, all USAFA IVD development was accomplished using our own instructors whose primary function was to teach cadets. Programming and lesson development were necessarily relegated to an additional duty status. Thus, a great deal of time and effort was expended to bring the current first generation templates to reality. Clearly, if the LL 2000 initiative is to be successful and come to fruition in a reasonable time, a cooperative, concentrated development effort with an interested partner who could bring additional resources to bear is needed.

ESL 2000: A MARRIAGE OF TECHNOLOGY AND OPPORTUNITY

Like many defense contractors in the 1990s, HRB Systems was seeking to diversify its business activities in response to dwindling government budgets, a drastically changed world order, and a more service oriented global economy. Unlike many companies, however, HRB has approached the challenge in a more grassroots manner. When, in early 1992, the parent company, E-Systems, called for input on how to diversify, HRB executives tasked their middle-

and first-line management to look beyond their traditional technologies and customer base for opportunities. Funds were subsequently allocated to investigate multimedia solutions to the problem of foreign language acquisition and maintenance.

Impetus for the project came from a variety of sources. The company had long been involved in computer-based training and had developed several CBT systems for teaching technical skills such as signals analysis, telemetry processing, and orbital mechanics. HRB also had experience in foreign languages and foreign markets, having developed and delivered several technical courses in Spanish and German for international customers. Additionally, several technical staff members had either taught foreign languages at the university level or had served as linguists in previous government and military assignments.

With a staff already familiar with both CBT technology and the problems of acquiring and maintaining foreign language skills, the possibility of developing multimedia tools for foreign language learning as a new product line become obvious. It was apparent, however, that a great deal of work had already been undertaken in the field of computer-assisted language learning and that HRB needed to canvass the community before committing significant time or funds. HRB had long discussions with the CALICO staff, the Language Department at the National Cryptological School, with CALL, and with numerous foreign language professionals at schools and universities throughout the country. HRB also met with the USAFA DFF staff, and was impressed with what appeared to be extensive integration of IVD throughout the curriculum.

Over the ensuing months, as HRB transformed its interactive foreign language film concept into reality, the company and the USAFA continued to consult on matters of mutual concern. HRB began to investigate further applications of the technology in the area of ESL/EFL and conceived a plan to develop a multimedia ESL curriculum for use in large learning centers such as the 64-station USAFA facility. At this point it became obvious to HRB that a cooperative research and development program could help both organizations. The USAFA had a vision of an improved and more effective multimedia delivery system (LL 2000) that could accommodate multiple languages and fonts in a lesson format conducive to rapid learning and long-term retention.

HRB's ESL-2000 concept envisions a modular language learning center that will use the new, improved USAFA development and delivery software for teaching English to speakers of other languages. The center will be equipped with MPC-standard multimedia workstations that will handle both videodisc and CD-ROM.

HRB envisions a 600-hour curriculum that will consist of a combination of multimedia programs and traditional classroom instruction, with the ultimate goal of achieving a 75% multimedia courseware and 25% instructor-led learning ratio. At the core of the multimedia courseware would be a commercially available video ESL program that will be converted to the USAFA's interactive-video format for self-paced instruction. The core curriculum will be supplemented with other commercial off-the-shelf multimedia programs to create 450 hours of information-rich, culturally authentic instruction that is both effective and stimulating for adult learners.

Obviously, both the USAFA and HRB Systems have a shared vision. The problem was how to marry the two into a mutually beneficial arrangement whereby USAFA's rich IVD expertise and the LL 2000 plan could be accelerated and made available for a commercial venture using HRB's resources. Fortunately, appropriate legislation had already laid the foundation for such a cooperative research and development effort.

FROM LEGISLATION TO SOFTWARE

With passage of the Federal Technology Transfer Act of 1986, the United States Congress made it possible for federal laboratories to more effectively transfer technology to the private sector. This law established a new way for industry to do business with governmental agencies: a partnership for mutual profit in the market place. The specific mechanism for this transfer is a Cooperative Research and Development Agreement, more commonly known as a CRDA. Such CRDAs are particularly well suited to President Clinton's vision of new roles for government. Moreover, he and Vice President Gore have set forth this concept with the policy statement "Technology for America's Growth" presented on 22 Feb. 1993, which directed agencies to remove obstacles to CRDAs and to facilitate industry-laboratory participation.

Air Force Regulation 80-27 implements the Technology Transfer Act of 1986 and provides policy for Air Force organizations to form CRDAs with businesses and to commercialize Air Force technology. At USAFA, Brigadier General Ruben A. Cubero, Dean of the Faculty, did pioneer work with CRDAs while Head of DFF and created a fertile environment for the development of interactive videodisc software and a state-of-the-art LLC.

As previously mentioned, this combination attracted the attention of HRB, a subsidiary of the Fortune 500 company E-Systems, which specializes in defense electronics and is seeking to diversify. After an exhaustive search of civilian and government institutions, HRB determined that DFF's software and vision for developing and presenting foreign language courseware was the best they found. In November 1993, USAFA signed a CRDA to enhance and extend this technology for use at USAFA and for production of courseware to be marketed commercially worldwide.

Developing the CRDA required careful negotiation and familiarization with numerous legal aspects. Fortunately, the Air Force and USAFA have singular expertise at their disposal in Attorney Jacob N. Erlich, Chief of the Hanscom Patent Prosecution Office, AFLSA/JACPB. Attorney Erlich holds a B.S. degree in Mechanical Engineering from Worcester Polytechnic Institute and Juris Doctor from Georgetown Law School. Furthermore, he was employed as a Patent Examiner for the U.S. Patent and Trademark Office prior to his current position with the Air Force. For those involved in similar negotiations, the single, most valuable lesson learned from these CRDA discussions is to locate that person within an organization with competence akin to Attorney Erlich's. Moreover, his publications on technology transfer and intellectual property provided extensive information on topics generally outside the purview of language educators and instructional designers. For instance, "intellectual property is an intangible or proprietary asset such as a Patent, Copyright, Trademark, or Trade Secret...." (Erlich 1992).

Software can be protected by patent, copyright, and trade secret. Patents are "granted for any new and useful process, machine, manufacture or composition of matter or any new or useful improvement thereof." (Erlich 1992). A U.S. patent provides protection of a patentable invention (which includes software) for 17 years. This patent protection gives the patent owner the right to prevent others from making, using, or selling the patented invention within the United States.

While patents protect ideas, copyrights protect the expression of the idea. This expression could be in the form of, for example, works of literature, drama, and computer software. Copyright protection takes effect upon the creation of the work and lasts for the lifetime of the author plus fifty years. Although copyright registration is advisable under certain circumstances, registration is not required for copyright protection to take effect.

Trade secret protection applies to business information (including computer software) only if the information is kept secret. Trade secret information should be appropriately marked, and disclosure of a trade secret without execution of a nondisclosure of confidentiality agreement would obviate this form of protection.

There is a subtlety vis-à-vis patents, copyrights, and trade secrets that is of great importance to many CALICO members — governmental organizations may obtain patent protection, however, copyright protection (except in rare instances) is unavailable for the protection of government works (17 USC 105), and trade secret (proprietary information) is limited, in some instances, by the Freedom of Information Act (FOIA). This aspect of intellectual property protection is in direct contrast to the customary protection of software by copyrights and trade secrets for those outside the government. Nevertheless a federal agency may work jointly under a CRDA with the private sector company to copyright the software if the company makes a substantial contribution to the creation of the software. In addition, the government may maintain as proprietary information inventions (including software) forming part of a patent application (35 USC 205) or proprietary information developed under a CRDA (15 USC 3710a(c)(7).

In order to alleviate some of the inequities in software protection between the private and government sectors, legislation is currently before Congress to permit the government to copyright software developed solely by government employees under a CRDA. Such fine judicial points underscore the need for competent legal assistance in the area of intellectual property issues when developing CRDAs.

Currently, DFF is in the process of applying for patent protection in existing software. In addition, the U.S. Air Force, under a CRDA between the USAFA and HRB, plans to jointly patent with HRB a next generation of L2 software as well as to assist HRB in the development of software to be copyrighted by HRB. This CRDA will, hopefully, lead to the successful commercialization by HRB of exciting new L2 software and access to these software programs by the Air Force for governmental purposes.

SUMMARY

The CRDA between USAFA and HRB exemplifies a new model for government and industry to support language instruction and embodies lessons learned over decade of experience with IVD as well as a vision for the future with the vast possibilities offered by multimedia. This CRDA enables USAFA to implement Language Learning 2000, a conceptual model for developing, presenting, and evaluating instructional strategies and materials. Furthermore, the CRDA provides HRB with the opportunity to produce and market ESL 2000, thereby diversifying its assets and generating new sources of income while supporting language learning. Finally, the CRDA directly responds to and instantiates Congressional legislation as well as a policy statement of the President and Vice President for transferring technology from government through industry to establish a stronger economy and country.

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PRESENTERS' BIODATA

Lt. Col. Peter J. Heinz has been teaching German with the Department of Foreign Languages at the United States Air Force Academy since June 1987. Since his arrival, Lieutenant Colonel Heinz has been closely associated with interactive video development efforts at the Academy. Currently, Lieutenant Colonel Heinz is an Assistant Professor of German, and is the Chief of the Academy's Language Learning Center where he is directing efforts toward development of second-generation IVD courseware.

Mr. Stanley A. Bishop is Director of Language Dynamics at HRB Systems, a subsidiary of E-Systems, where he oversees the development of multimedia products for foreign language acquisition and maintenance. He formerly managed HRB's international training group and was responsible for developing and implementing technical training programs in several foreign languages. During his 35-year career he has held positions as a government linguist, foreign language instructor at the National Cryptologic School, superintendent of training at Westinghouse's school in Saudi Arabia, German instructor a the University of Maryland, and bilingual training consultant at Morgan Management Systems. He also taught graduate courses in cross-cultural and international training at the Pennsylvania State University. Mr. Bishop has B.A. and M.A. degrees in German and an M.A. in Executive Development for Public Service. He has formally studied ten foreign languages (some of which he even speaks) and has worked and traveled extensively in 43 foreign countries.

Lt. Col. Richard L. Sutherland has written several articles, held numerous workshops, and presented frequently on the integration of technology into language learning centers and classrooms. In 1991, he received his Ph.D. at Utah State University, where he was honored as "Outstanding Ph.D. Scholar in Instructional Technology." Currently, he is the Director of Research in the Department of Foreign Languages at the United States Air Force Academy and helping to make language files and courseware available worldwide via Internet.

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HUMAN FACTORS IN CALL SOFTWARE DESIGN: EXAMPLES FROM THE CREATION OF MULTIMEDIA DICTIONARY SOFTWARE FOR THAI AND INDONESIAN

GEORGE M. HENRY AND ROBERT A. ZERWEKH

ABSTRACT

The development of a multimedia electronic dictionary for Thai and Indonesian provides ample evidence to refute the claim that software development can proceed linearly from analysis to design and then to implementation, testing, and finally to use. Rather, any substantial or innovative software must undergo an iterative development process that involves interaction with its end-users who always find things to change. In CALL, the materials/courseware developers are an important group of users whose efforts contribute vitally to the quality of the end product used by students. This presentation will demonstrate the multimedia dictionary software, and will provide concrete examples of the iterative process described above.

DESCRIPTION OF MEDSEAL

In January of 1993 we began software development for the Multimedia Electronic Dictionary for Southeast Asian Languages (**MEDSEAL**). At present, dictionary compilation is proceeding for Thai and Indonesian. The **MEDSEAL** system allows students to look up words interactively, to browse through the dictionaries, to view pictures of certain words, to listen to pronunciations, and to print all or selected parts of a dictionary, including an individualized list of words looked up during a session. A font has been created for Thai that allows users (either students or dictionary authors) to type Thai words using a software "virtual keyboard" by clicking on an image of the Thai keyboard on the screen. The software also supports real keyboard typing.

The **MEDSEAL** system consists of two main programs. One is the dictionary proper, designed for student use. A student can type a word and the program presents a long and a shorter English definition, a definition in the second language, sentences that contain the word in use, and additional historical, grammatical, or cultural notes about the word. Students may also hear the word pronounced and see a picture of the word.

The dictionary can also operate invisibly while a student is reading an on-line document in the second language. In this mode of operation, a student simply highlights a word using the mouse and requests the word's definition. A small window appears that presents most of the information described above. At the end of a session, students may print the words (and their definitions) that they have looked up.

The second main program is the dictionary authoring program which lets authors enter the foreign language words and the information associated with the words. The authoring program supports instant search and retrieval capabilities by having an author type in a word or the first few characters of a word. This program allows addition and deletion of words as well as updating any of the information associated with an existing word. Dictionary authors may print all the words in a dictionary or a selected subset of words. The printing menu allows them to select how much of a word's information they wish to print.

EXPERIENCE WITH USERS

At the time of the original grant proposal for this project, careful attention was given to the design specifications of the dictionary software. The chief programmers and foreign language specialists considered many features and modes of operation, eventually proposing what was believed to be a very sound and well thought out system. After a working prototype of the authoring program began to be used, however, it became apparent new requirements were emerging as authors gained experience and familiarity with the software.

Although the notion of refining software based on actual use is understood in the abstract, it is instructive to provide some general principles that help explain this phenomena and to illustrate these principles with specific examples that arose in our experiences with the software users. These examples are drawn from experience with the dictionary authoring program since that is the program most extensively used to date. The principles expressed should generalize to other classes of users (e.g., students) and to other large software development projects.

Principle I - People will always find a way to use things that the designers did not anticipate.

One of the original features of **MEDSEAL** was the ability to create multiple dictionaries for a given language. It was envisioned that if a dictionary was distributed to other interested parties, our language experts (or experts at other institutions) could later add new entries in the form of "supplemental" dictionaries. In this way, many people from various locations could all contribute to the one, big "Thai dictionary," but, in actuality, it would be a logical concatenation of separately compiled dictionaries. Another reason for the creation of multiple dictionaries was to allow teachers to create simpler dictionaries for beginning students of the language. Such dictionaries could contain fewer details and simpler definitions, or perhaps definitions that were keyed to the use of a word in the context of a specific reading or lesson. Although the original design did support multiple dictionaries per language, copying individual words from one dictionary to another was not supported. Early in dictionary compilation, however, our users expressed a strong desire to be able to copy either all the entries or selected entries from one dictionary to another (see Principle II below).

The addition of this feature then caused a totally unanticipated change in the work practices of the Indonesian team of dictionary authors. Whereas prior to the copying feature each author would enter a word plus all of its information fields, they now set up a production line environment where each author had a personal dictionary in which he or she would enter specific pieces of information for each word. Bob, for example, would write the long and short English definitions for each word in his dictionary. When finished, he would copy these words to Vitri's dictionary and she would add the L2 definition and usage examples. In all, the Indonesian team had nine separate dictionaries, with the last dictionary containing the final form of the entry.

Another example of this principle relates to the printing features. Printing originally was included so that students could print a list of words looked up during a session. Our authors, however, wanted to generate printed lists of completed entries and entries-in-progress. In this way they could perform an off-line review of their work and more easily reach decisions about what remained to be done. The language teachers also found an unanticipated use for the printing feature. They realized that they could print a list of words from a dictionary (or dictionaries) to distribute as a study guide to their students. So printing, which was originally intended for student use (and was intended to be implemented late in the development lifecycle), became a necessity for authors and a feature that we had to implement very early.

Principle II - People will always want or need features that they did not know they wanted or needed until they begin to see and use the software.

Each word in a dictionary may have a speech associated with it and authors are obligated to place the speech file name into the database record associated with a given word. Thus "apple," for instance, may have "apple.wav" for its speech file name. The burden of devising and remembering hundreds of (unique) speech file names led our authors to request a program that automatically named speech files. The programmers then wrote a digital "tape recorder" program that automatically assigned incrementing numbers as speech file names. It was then a simple task for an author to record a speech and paste the generated speech name into the database record.

Often users want to exceed arbitrary limits that initially seemed reasonable. In the case of the dictionary, the total number of pictures and the amount of text per entry needed upward revision. Our original projections were that one in 10 words in a dictionary would have a picture and that certain text fields would not exceed 500 characters. The first dictionary compiled by the Thai team, however, showed that these original projections were grossly underestimated. In this dictionary, there was almost a one to one correspondence between words and pictures, and the text fields noted above had to be expanded to twice their original size. The level of desired detail vastly exceeded what was originally thought.

Another interesting instance of Principle II concerned the treatment of homographs. Since the dictionary database requires that each word be stored using a unique identifier, the programmers thought that one entry could simply contain multiple definitions for homographs. The authors, however, wanted two or more separate entries for homographs, and since this was impossible given the unique identifier constraint, we decided to implement homographs as multiple entries but with unique keys. If a student looked up the word "bow," for instance, they would find the following information: See "bow1" or "bow2" or "bow3." A student could then enter "bow1" and see the definition "front of boat," or "bow2" and find "polite lowering of head/upper body."

Because of this change in the software, we then added copy and paste capabilities so a student could consult the word "bow," copy "bow2," and then paste it into the lookup field, eliminating the need to recall and type the exact spelling of the variant. Then, since it was highly likely that all "bows" were very near one another, "next word" and "previous word" push-buttons were added to the dictionary program. These changes speeded up the lookup process since now students will not have to type in an exact word or switch to browse mode to find a given homograph.

Two more examples illustrate how users develop needs only after using the software. In one case we had to alter the standard **Windows** behavior for text display windows. A scrolling text display window does not indicate in any fashion if there is more text that is currently hidden from view. Our authors thought that students needed to be told that additional text remained in a window so they would be sure to read all of the information. We added a small green light on each scrolling text display window that tells a student when more text remains to be read. The light goes off as soon as the last line becomes visible. Finally, a word's English definition was originally meant to contain only roman characters since English consists only of those characters. Our Thai team, however, quickly discovered that they needed to be able to mix Thai and English in this text display window, for example, so that they could show various Thai classifiers for different words. So the software was changed again to accommodate this desire.

There are many other instances that illustrate Principle II. In fact, users still confront us weekly with a wish list. We have found that we have had to deny some requests and to postpone others for fear that we will never get around to finishing some of the features that absolutely must be finished (e.g., online help documentation).

Principle III - Preferences and priorities among users and between developers and users will certainly differ.

One illustration of different thinking between developers and users concerned how the various push-buttons were enabled and disabled. The developers thought that the buttons should be enabled and disabled in a logical fashion; i.e., don't enable the "update" button until a change has been made to an existing word. Yet users wanted the "update" button enabled as soon as a word was retrieved into their editing window.

In the early versions of the authoring program, an author was notified that a word already existed in the dictionary when an author pressed the "add" button. The program then cleared all text entry fields. Our users found this extremely annoying and time consuming, particularly if they had just entered lots of information about a word only to have the program erase the on-screen text information after a friendly warning that the word already existed. They requested that they be informed about duplicate words as soon as the cursor left the word entry field, before they had a chance to enter any additional information. This feature was added and our users smiled again.

Different preferences were found among our users as well. We have a feature in the dictionary program that gives students additional language specific help in looking up a word. If students wish to look up the Indonesian word "menyewa," for example, they may request the extra help which will give them a list of possible root forms from which to choose, making their lookup task a bit easier.
Some teachers thought the extra help feature should be in effect for all students at all times. Others wanted the ability to control whether the extra help would be in effect for individual students on the theory that this extra help could short-circuit the learning process. The latter thinking prevailed.

Principle IV - Important aspects of the way people use the system depend on certain software features and structure.

Since one of the operational modes of the dictionary program allows students to look up words encountered while reading an on-line document, we discovered that our authors were inclined to provide definitions for most of the words in a given reading assignment. So instead of constructing a dictionary alphabetically, or by following a set of high frequency words in the language, the growth of a dictionary was driven by the contents of the reading assignments. Our first Thai dictionary, for example, was constructed around a recipe for green curry with chicken, so most of the words in that dictionary relate to food.

One other example of this principle has to do with the multitude of disparate tasks that are involved in constructing a complete entry for one word. It has been noted that a word entry contains text (and for Thai this almost requires the use of the floating virtual keyboard), a sound recording, and a picture. Although it is possible under **Windows** to have all three of these editing tasks running concurrently, the screen crowding induced by the multitude of open windows apparently has dissuaded our users from attempting to engage in all three editing tasks at once. Instead, they have adopted a task by task mode of operation where they will enter the text for a number of words, then add sound recordings at a later date, and finally construct pictures for certain words. The assembly line environment that the Indonesian team invented is particularly amenable to this mode of operation.

CONCLUSION

The experiences with software users in the **MEDSEAL** project has helped to reinforce the truism that software development is an iterative, exploratory process. The refinements and alterations made to the software were caused by the interaction of users with software, and by the open communication of users and designers. The process of developing new software was aptly summarized by Eric S. Raymond when he wrote:

> Creationism *n*. The (false) belief that large, innovative designs can be completely specified in advance and then painlessly magiked out of the void by the normal efforts of a team of normally talented programmers. In fact, experience has shown repeatedly that good designs arise only from evolutionary, exploratory interaction between one (or at most a small handful of) ... designer(s) and an active user population - and that the first try at a new idea is always wrong. Unfortunately, because these truths don't fit the planning models beloved of management they are generally ignored.
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> Eric S. Raymond, 1991. *The New Hacker's Dictionary.*

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HISPANIA ON CD-ROM: A LOOK AT THE ALPHA DISK

NICOLÁS HERNÁNDEZ, JR.

This paper is the first look at the prototype of *Hispania* on CD-ROM at a major scholarly meeting, the CALICO 1994 Symposium. Established in 1917 as the *Journal of the American Association of Teachers of Spanish and Portuguese*, *Hispania* is the leading source for research articles, bibliography, pedagogical papers, authoritative book reviews, and software reviews in its field. Devoted to complete coverage of Spanish and Portuguese scholarship, whether in Peninsular or Latin American studies (languages, linguistics, literatures and pedagogy), it is scheduled for release in a retrospective edition in May 1994. This paper describes, analyzes, and demonstrates the scope and navigation of the electronic edition of this important resource.

This presentation gives a detailed look at the prototype of *Hispania* on CD-ROM. Developed for the editorial team of *Hispania* by IBUKI, it is one of the first major academic journals to go into retrospective publication on CD-ROM. *Hispania* is published by the American Association of Teachers of Spanish and Portuguese (AATSP).

The prototype disk of *Hispania* is used with the IBUKI **Viewer** (which is a derivative of the Microsoft **Multimedia Viewer**). The **Viewer**, available on a 3.5" HD diskette, must be installed onto Microsoft **Windows** 3.1. For this demonstration the actual *Hispania* "book" has been packaged as a 3.5" HD diskette (when released this, of course, will be on CD).

Installation of the *Hispania* "book" is simple. When both pieces of software are loaded, navigation is remarkably easy. For this demonstration the following issues of the journal are used: *Organization* Number 1917, *Hispania* Volume 1918, and *Hispania* 1988, Volume 71, Number 4.

Navigation is effected at the top level on the Menu Bar, which contains, from left to right: File, Edit, Bookmark, and Help. Button Commands, at the second level, permit searching for desired texts; successively they are: Contents, Index, Back, History, Left Arrow, Right Arrow, and Search. On the third — or text level — we find the text itself. And within the text are included Hotspots. These provide the normal print support apparatus associated with paper texts, but they also permit cross-references and additional supportive material well beyond paper and paste. Hotspots include: Brief Notes, Jumps to other Pages, Footnotes (which can be nested), References (also nestable), Guides, Pictures, and Textual Variations.

Searching can be done on the whole text or on topic lists. Proximity checks have a variable counter, set by default on eight words on either side of the lexical item or string being sought. All Boolean operators are allowed.

An important question for the electronic publisher is whether one can search by language in the main text of an article, or in documentary material. The virtual text poses one difficulty which the electronic edition of *Hispania* partially answers: Do we as scholars no longer cite pages? At the beginning of each article entry, the range of pages of the paper text is indicated, but no markers are included within the electronic text proper.

Ease of use is a hallmark of this new **Windows** product. The user with a moderate command of **Windows** will navigate these texts with great ease.

The Annotations feature is remarkable. Visually appealing, a green paper clip on the main text screen indicates the presence of commentary added by the user. Click on the clip and the annotation becomes visible.

Since this is a demo of the Alpha disk, some of the features of the IBUKI **Viewer** applied to *Hispania* yield examples drawn from other IBUKI books.

However, all features of the viewer/book combo are illustrated. In testing this package on my home computer, I detected no installation or run-time errors or bugs.

COVERAGE

In addition to the contents of a cumulation of complete annual volumes (see Cost below), the following topics on diskette are also available, at a cost of $69 US per set:

- Women and Feminism
- Grammar (Spanish)
- Authors (Separately):
  - Cervantes
  - Dario/Modernism
  - Galdos
  - Lope de Vega
- Luso-Brazilian Studies
- High School Courses/Curriculum

Advertising and other ephemerae are not included in the CD-ROM edition of the journal.

EQUIPMENT

MS-DOS machine, 286 or higher microprocessor, running Microsoft **Windows** 3.1, interfaced with a standard CD-ROM reader, with at least 2 MB RAM; a hard-disk is required.

COST

Pre-paid subscription at $99 US for individuals, and $150 US for institutions, will determine scope of coverage as follows:

- 25 years of *Hispania*, with a minimum of 150 subscribers.
- 50 years of *Hispania*, with a minimum of 500 subscribers.
- 76 years of *Hispania*, with a minimum of 750 subscribers.

That is to say, early subscribers will receive up to 76 volumes of the journal according to the scale above.

SOURCE OF SUPPLY

IBUKI
Hispania Articles
P.O. Box 1627
Los Altos, CA 94022
Phone: (415) 961-4996
Fax: (415) 961-8016
E-mail: books@ibuki.com

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This paper and presentation would have been impossible without the assistance of Dr. Estelle Irizarry, Editor of *Hispania*, Spanish Department, Georgetown University, Washington, DC 20057-0989, USA. She was instrumental in providing clearances and encouragement for this unveiling.

Grateful acknowledgment is due to Mr. Richard Weyrauch, President of IBUKI, for furnishing the software package and necessary documentation before the actual release date of *Hispania* on CD-ROM. As this article goes to press, October 1994, I have been privileged to use materials variously copyrighted from 1992 through 1994, including a yet-to-be-assigned ISBN Number for the *Hispania* "book." As of this writing, I am using IBUKI company software files dated as recently as 01-23-94.

PRESENTER'S BIODATA

Nick Hernández, (Ph.D., Cornell University), is Associate Professor of Spanish at Russell Sage College. A member of the EDUCOM National Review Panel since 1988, he is the incoming Chairperson of the CALICO Courseware Development SIG, and reviews software for *Hispania*.

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HYPERMEDIA ANNOTATION OF TEXTS

DAVID HERREN

ABSTRACT

Guided Reading is an authoring system designed to simplify the annotation of texts using CD-Audio, color images, digital sound, digital video, videodisc, and of course, extensive textual annotations. In addition to the commonly taught western languages, it now supports Arabic, Chinese, Cyrillic, Korean, and Japanese character sets. Its features include the ability to annotate any phrase long enough to be unique with a CD-Audio segment, 22 pages of text, a digital movie or segment thereof, digital sound, a full color image, and a videodisc segment. The skill required of the instructor to use any or all of these technologies is no more sophisticated than that necessary to use a television remote control.

In this session the author will demonstrate the features of **Guided Reading** and will actively prepare an annotation of a Spanish text (though some examples will also be in English). With the first annotation of each type, the presenter will introduce the technology itself, aiming that introduction at the beginner or intermediate user of hypermedia technologies.

Some attention will be paid to the non-western character sets — Arabic, Chinese, Cyrillic, and Japanese — and the technologies necessary for their use will be discussed.

The annotations, once complete, will be demonstrated as a student might use them. Each media annotation is delivered to the student in context without ever leaving the text itself. The student may take notes on the text or use the glossary function which can be printed and/or saved to disk for future reference.

PRESENTER'S BIODATA

David Herren is the Special Assistant in Technology to the Vice President for Languages and the Director of the Language Schools of Middlebury College. He has been actively involved with technology in language education since the early 1980s and has presented and conducted workshops around the world. Recently he was selected as the NEH-sponsored "mentor" in technology to the AACC project "Improving Foreign Language Education at Community Colleges."

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A REPORT ON THE SAN FRANCISCO GOETHE INSTITUTE E-MAIL PROJECT

ADOLPH N. HOFMANN AND IRMTRAUT HUBATSCH

INTRODUCTION

E-mail in instruction is an almost obvious idea whose moment has arrived, and will truly expand in the next several years. The concept of the Internet is a powerful motivating force that will likely hold the imagination of many teachers and students over the next decade.

This project describes a way of capitalizing on this momentum, and suggests that we should strive to have our classes communicate internationally.

Using e-mail in the Language classroom may strike many CALICO members as a low-end application of computer technology. In many senses, we feel this is one strength of this initiative. CALICO members may have in their areas less initiated teachers who look enviously in their direction, wondering how to become involved with technology and incorporate it in their classroom. An e-mail project may be the answer. Technology requirements are minimal: the computer need not be the latest but must be equipped with a word processor, a communications package and a modem. A telephone connection to the outside world is the only other necessity. Practically all high-schools, certainly all community colleges, colleges and universities are so equipped.

Beyond this, the requisites for a successful project are the teacher's energy, work, organizational skill and commitment of the instructor in the intermediate language situation. The rewards of incorporating e-mail are almost immediate. Instructors will find it an enhancement to the writing component in the intermediate situation, a motivating force for the students who enjoy partaking in projects that entail global exchanges. Finally, it prepares students for the computer-oriented world they will face in their work.

GOETHE INSTITUTE PILOT PROJECT

The Goethe Institute E-mail Project in its current status in northern California, central Colorado and Hawaii involves a group of practicing teachers, thirty plus, who are enthusiastic about the project and are obtaining good results.

A dozen or so teachers participated in the pilot phase during the Spring of 1993 and again in the Fall of 1994. Many sent and received e-mail regularly and had good success at their schools. As of Fall 1994, sixteen teachers are involved in the project in northern California, having integrated e-mail into their instruction with good success. On January 12, 1994, the Project received at least fifteen seconds of fame on the nightly news, when Vice President Gore visited Monte Vista High School in Cupertino, where he talked with Danny Cheng, a student in one of Gerda Story's German classes. Danny was sending e-mail to and receiving it from a partner school in Bremen.

The numbers of Project teachers are increasing. In Colorado, fifteen teachers are sending e-mail, after a workshop was held in Boulder in December 1993. A "Guidebook to E-mail" has been created and tailored to specific areas, since the dominant networks differ from location to location, i.e. Colorado SuperNet is different from CORE, California Online Resources for Education.

PROJECT STRUCTURE

Structuring the overall project is of great importance. The Language instructor must negotiate with one's partner teacher in Europe, or wherever. My object as a German teacher is to have my students write as much as possible in German, in order to improve their writing skills. However, one must always keep in mind the question, what is the partner teacher and his/her students in the other country gaining from the exchange? If the students in Europe or wherever are in studying English, they may really want and need to practice their English, and not their German. These are real

and essential considerations that the project teacher must negotiate with his/her counterpart(s) from the very start.

I was impressed from the beginning in the Spring of 1993 with what my students were achieving. They wrote long compositions on themes we had discussed in class, describing their county, their concerns, their lives. The responses from Germany and the sense of excitement that I shared with my students motivated me to continue.

AUDIENCE

With e-mail my students had a very real point to their writing, since they were communicating with other people, real people, in Germany. They had an audience that read their work. The student's writing is after all going abroad via a system of technically sophisticated cables and satellites. In effect it is published twice: once in Germany, where it is presumably downloaded and passed out for the German students to see, and a second time in our classroom. If the work is posted on a bulletin board in the language lab, that would be a third publication to be noticed and read by others.. This multiple publication puts the burden on the student (and on the teacher) to see that his/her work will bear such a critical process. Correction is taken quite seriously. Students enjoy reading each other's work, or reading their own aloud to each other. They take pride in their work, and enjoy the approbation of others. The exclusive loop between teacher and student, the former writing a composition, the latter correcting it and handing it back, is widened considerably.

Though a pen-pal phase is an excellent idea after initial introductions have been made, e- mail lends itself to the exchange of projects. Here the creativity of teacher and class may come to the fore.

A PROJECT ON THE SUBJUNCTIVE: LETTER TO PRESIDENT CLINTON

President Clinton, it is widely known, studied German at Oxford, has sent his daughter to German camp in Minnesota, and speaks German with her. In an intermediate class where we were studying the subjunctive, the class has been assigned the task of writing a letter to the President Clinton, advising him on what to do in his presidency. *Wenn ich Sie wäre, würde ich. . . An Ihrer Stelle würde ich . . .* One ultraconservative young man, a Rush Limbaugh fan, wanted to tell the president off, but in German that was utterly correct. At the same time, he realized that his written German wasn't the best. I said I would help, if he was willing to rewrite three or four times. He agreed and wrote the president, saying that he rejected him and his policies in no uncertain terms, all in good German. He had been enticed by the idea of the possibility, however remote, that it would arrive and be received.

E-mail creates a fresh audience beyond the teacher and makes Germany quite real and immediate. This is something that the ordinary classroom cannot offer. The technological speed with which e-mail transpires, which is part of its attraction, helps build and sustain a mutual audience. The creative teacher will find ways of building on the excitement e-mail technology creates.

GROUP WORK

On occasion, my students worked in groups to correct each others' letters. E-mail does lend itself to group work, an important aspect of communicative learning. After I allowed reading the e-mail from Germany to count as FL lab time, students took up the offer and did this in groups of four or five. Group work is important to the e-mail concept and should, I feel, be encouraged. I find that groups take on their own dynamic, depending on the personalities involved, and evolve a learning style unique to themselves. "Let's do this, let's do that." The enthusiasm that emerges from such interchanges within the class then extends beyond the e-mail projects to skits and other activities.

INSTITUTIONAL RECEPTION

After we made a bulletin board in the FL lab to post the latest transmission of e-mail, both by our students and then the responses from Germany, other German students in other classes, as well as other FL students generally took notice. FL and ESL teachers would inquire about the project. Word began to spread.

The larger campus was informed, but only after inquiries on the part of the administration, who were pleased and intrigued that instructors are actually using the technology they have heard so much about. The experience of the Project teachers is that administrators approve and at times, even lend financial support to it.

THE END OF THE FIRST PHASE

In total, the complete correspondence that we were able to exchange with the classes of Max Linsmeyer, an English teacher and Detlef Ehrig, a German teacher at the Ubbo-Emmius Gymnasium in Leer, a small city near the Dutch border, comprised one hundred fifteen pages of single-spaced prose, most of it sent by my students. Sometimes a given transmission would result in a file of twenty pages or more. In mid-semester, we exchanged "Welcome Packs" - an idea borrowed from the AT&T "Learning Circles." These are snail-mail packages of brochures, post-cards, photos, cassettes, bits of realia exchanged with the correspondent class in Germany to make the exchange more tangible.

The students in Germany were obviously sitting at computers in pairs or sometimes in threes, composing letters. At times their written results reflected their teenage years, but they did write enough serious and interesting things to validate the basic principle that real communication was occurring. Serious exchanges took place on issues like xenophobia, drugs, and youth problems. One "problem" with the exchange, was that my students were older and more mature than the Germans. While the fit might not have been perfect, I sensed the students on both sides of the ocean slowly moving towards each other in this new medium.

LANGUAGE AND THE QUALITY OF COMMUNICATION

What the German students contributed to their side of the exchange was language direct from Germany, rich in idiom, a combination of *Hochdeutsch* and *Umgangssprache* that makes the language of German textbooks appear rather stale in comparison. Communication under these circumstances reflects students' maturity, their experience and linguistic ability. Perfect communication, whatever that is, may under these circumstances not be a realistic, nor even an interesting goal. What is more significant is that students have the opportunity to examine and think, wonder and hopefully elucidate differences in language and culture. When I examine the correspondence of the Spring 1993 exchange, I find all the ingredients of real communication: information is exchanged, there is humor, the serendipitous as well. Everything is there.

E-MAIL IN PRACTICE

Managing many files on disks from many students can become frustrating and problematic. If students have ready access to computers on campus and at home, they create files on both major platforms, PC and Macintosh. The teacher can be confronted with the formidable task of pulling together files from a dozen diskettes. Here it is advisable to ask students to help. One student will usually volunteer to pull together all of the Macintosh files onto one disk, another to do the same for all of the PC files.

Having several diskettes, one with Macintosh files, another with IBM files then poses the problem of translating the Macintosh files into PC or vice versa. Fortunately, translating programs are becoming more common these days as interaction between the two platforms becomes a daily necessity. Moreover, the two major platforms seem almost ready to converge, so that this should be less of a problem in the future.

At some schools, especially colleges, students have their own e-mail accounts. Here, the students can send mail to Germany directly, if that is what they and the teacher have decided to do. Letting the students close to the technology is a major goal of the project.

At my school, students have acquired their own accounts. The process goes as follows: students write compositions either by hand or on computer, handing me a hard copy for correction. After a first correction, I may ask them for a second, sometimes, a third, especially if the composition is a longer one and stylistic considerations are important. Then the student uploads or types the composition into their mailing account. Thereupon the composition is sent to my e-mail account where I look them over, give them a final grade, collect them into one large file, and finally send them to Germany.

Other Project teachers approach this matter differently. Some are not concerned about the correction process, letting their students write directly to Germany. Again, this is up to the individual teacher. S/he must decide what is appropriate and fits the classes abilities and needs.

CURRENT WORK

Currently, my students are working on a project entitled Work Experiences. They are writing a composition about that subject, and have been directed not only to describe their jobs, but to draw a few conclusions about their work, current and past. At the same time, we have prepared a questionnaire about "Work after School." One of the Project teachers, Mary Farquhar, who teaches at Lowell High School in San Francisco, introduced me to the questionnaire, though its source is a class in Germany. For our purposes, we have improved somewhat on the basic questionnaire on the basis of an article on student employment in Germany in *Die Zeit*. Each student will get ten responses from students at our college, which will be tabulated and compared with results from Germany. Finally the whole matter will be put into booklet form and distributed to each student.

PREPARING OUR STUDENTS FOR THE 21ST CENTURY

If the standard of living of Americans in the future is dependent on the skills and insights of our work force, as Robert Reich explicitly states in *The Work of Nations*, then, I would argue, we as language teachers might regard it as part of our assignment to give our students the two essential tools they need for international communication: an important language — in my case that is German — and telecommunication skills. To this end, e-mail in the classroom is right on track and right on time.

PRESENTERS' BIODATA

Adolph N. Hofmann, German Instructor, Santa Rosa Junior College, was one of the initial teachers trained for the E-mail Project in February of 1993. He has created a Guide to E-mail for northern California and Colorado teachers of German. His students continue to exchange e-mail weekly or bimonthly with students in Germany.

Irmtraut Hubatsch, Language Director of the San Francisco Goethe Institute, is the originator of the E-mail Project and has promoted the project in northern California from Chico to Monterey, throughout central Colorado, and in parts of Hawaii.

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A Multimedia Approach to Teaching Colloquial Language

Debra Hoven

ABSTRACT

This presentation will begin with a short description of a nationally-funded project to introduce multimedia technology to Australian secondary schools, particularly for distance delivery modes.

The presenter will then demonstrate techniques developed as part of this project using both audio-only and audiovisual modes. The program demonstrated will incorporate the use of digitized speech and a repurposed laserdisc of an Australian "soapie" to illustrate techniques for allowing secondary and adult learners to develop self-directed learning skills through listening and viewing comprehension. English examples will be used, though the program is transferable to other languages for developing learners' understanding of colloquial language, idiom, and paralinguistic features of language.

BACKGROUND TO THE PROJECT

Because of great distances and sparse population in Australia, distance delivery of learning materials for secondary and adult learners, particularly through multimedia, is becoming increasingly important. Hand in hand with this is growing understanding of the necessity of fostering in learners skills and strategies in self-direction and autonomy to take full advantage of learning in distance mode. However, in spite of increased government spending on distance education, funding available to schools remains limited. Multimedia materials must therefore require little more than existing equipment for their operation in order to be usable by schools and learners in distance education contexts.

Parts of the package discussed here were developed as an Australian Second Language Learning Project (ASLLP) funded by the Commonwealth of Australia's Department of Employment Education and Training to meet some of these needs and requirements. The project concept and tools were based on prior work in the areas of a taxonomy of listening comprehension tasks, CALL tools (Hoven 1991), and interactive digitized audio (IDA - Lian 1991). Further refinements and significant features of the package to be demonstrated have been developed by the presenter since the completion of the project.

The ASLLP project started with a survey of a number of metropolitan schools to ascertain the level and range of their existing hardware and software, commitment of management, parents and teachers at the school to future investment in technology, current uses of technology in the school, access by language learners to existing technology, and openness of language teachers to the concept of increased use of technology for language learning either in class, or in self-access mode in a specialized learning centre. This survey highlighted the need for more teacher education in the uses and applications of technology in language learning. The survey found a distinct lack of knowledge of the multimedia capabilities of available language teaching hardware and software among both language teachers and "computer teachers," a lack of understanding of how such capabilities could be used with their learners, no scheduling of time for language learners to use the available computing facilities, and a pervasive distrust of the pedagogical soundness of CALL software and the methodological standpoint of its designers.

AIM AND SCOPE

The scope of project then became to develop and publicize a language education system based on innovative technology, and provide exemplar lessons using this system. Because of the minimal computing facilities available in many schools, the system was to be developed with an audio-only mode using digitized sound for schools, with an additional audiovisual mode using laserdisc technology for schools and tertiary

institutions with higher levels of funding for technology. It was decided by the project management team that providing teacher education and training in use of the package was beyond the means of their staffing, timeline, and funding. The aim of the project was therefore to develop:

1. An interactive digitized audio and laserdisc authoring package that
   - could be used by computer-literate teachers;
   - could be distributed via floppies (for distance mode) or via a network;
   - used authentic language material;
   - encouraged learner autonomy;
   - was flexible enough to be useful for secondary and tertiary level learners;
   - was compatible with existing hardware/software, principally purchased for areas of the curriculum other than language learning;
   - was usable on machines ranging from the most minimal platform commonly available in schools to more sophisticated configurations found in some private secondary school and tertiary computer laboratories;
   - made provision for authoring listening activities that covered the range from the word/sentence level up to discourse level, especially the latter;
   - provided a "browsing" facility as the basis for the "Help" system, and to build in flexibility;
   - included a simulation of cassette deck controls, using screen navigation and digitized sound.
2. Lesson exemplars using the package.

THE AUTHORING PACKAGE

Design and Purpose: Humanizing the Interface

Computer technology can be used to manage learning by making available to learners an environment in which there is a range of useful language learning material, feedback which assists them in evaluation of their own progress, and a help system which provides them with choices from a variety of sets of information, whether it be in the form of dictionaries, transcripts, replays, or grammatical or lexical explanations. This is the role of computers which has formed the basis for the instructional design of the computer-assisted listening activities discussed here. By incorporating this management model with a learner-centered philosophy, a system has been designed in which learners have maximum control over the flow of the "lessons" or learning material, while at the same time being able to improve their listening comprehension skills and develop their facility in managing their own learning. It is important that technology, especially computer assisted learning materials, be seen as a resource in an existing methodological framework (Hoven 1992). As such, software and courseware should incorporate the development of the same skills, processes and strategies as other parts of the learning environment, while exploiting the technology in the most appropriate way. As Robinson (1991) reminds us, it is not good enough to merely put students in charge of their own learning; they need to develop the skills to control what they are doing. It is necessary therefore that learners see computer enhanced language learning (CELL) as an integral part of their total learning environment (Lian 1991). To develop the skills and processes necessary to manage their own on-going learning, learners need training and practice in the use of appropriate learning strategies — both cognitive, metacognitive, and social. The CELL authoring package discussed here has been designed within the context of an environment such as that outlined in Figure 1 below.

A Model of a CELL Learning Environment

- Create a total learning environment,
  task-based and/or process-based syllabus,
  with focus on:
  - learning strategies (learning how to learn),
  - language functions / purposes,
  - language structures,
  - paralinguistic features (sociocultural),
  - autonomy / self-direction.
- Design all activities to focus on the development of control and responsibility for own learning.
- Cultivate learner self-direction and autonomy.
- Provide access to facilities for multi-channelled perception/production.
- Cultivate self- and peer feedback and evaluation (to improve techniques improve self-confidence and group cohesion).
- Integrate CELL into environment by designing activities incorporating self-exploration and self-discovery of problems and errors.
- Provide a range of print and non-print based resources, including student-andteacher-produced materials and well as those commercially available.

Figure 1. (adapted from Hoven 1992, 24)

In the design of the interface, the nine heuristic usability principles of Nielsen and Molich (1990) for user interfaces were a useful reference, as they represent a common sense approach (see Figure 2). Principles 3, 6 and 7 are addressed by having the navigation buttons labelled and on the screen at all times. By using familiar cassette-deck buttons for sound and visual navigation, and pull-down menus for all other navigation incorporating dialogue boxes using "plain English" explanations, principles 1, 2, 4, and 5 are followed. In author mode, principles 8 and 9 are met by providing error-specific messages and clear instructions.

1. Simple and natural dialogue
2. Speak the user's language
3. Minimize user memory load
4. Be consistent
5. Provide feedback
6. Provide clearly marked exits
7. Provide shortcuts
8. Good error messages
9. Prevent errors

Figure 2. (adapted from Nielsen and Molich, 1990)

The Materials

The episode of "A Country Practice" that had been chosen prior to the project for pressing onto laserdisc, was one containing a lot of emotional interactions. This was seen as being of the most use for English as a Second Language (ESL) learners because of the range of gestures and expressions used. As such paralinguistic features are culture-specific or even idiosyncratic, an understanding of their use and appropriateness is often difficult to access for ESL learners. The focus of the laserdisc learning materials is therefore on the paralinguistic rather than, but not excluding, the linguistic features. The audio-only materials, on the other hand have more of a linguistic focus, being based on idioms and colloquialisms, language functions, interaction sequences, and discourse features. "A Country Practice" is highly appropriate for this purpose because, being on television, the voices of characters, the themes, and the narrative genre are familiar to learners. The program is also popular among native speakers of the same age groups and is therefore often discussed in casual social contexts. As casual conversation topics are difficult for ESL learners to negotiate, providing them with a means of thoroughly examining the background and bases of a few topics is a step towards helping them become more fluent in these contexts. The package was designed with repurposing in mind so that it could be used with other laserdiscs in other languages.

"A Country Practice" is regarded as being authentic language in that, though scripted, it was written for native speaker consumption and not for pedagogical purposes. The major advantage in this is that the material itself does not tie teachers and learners into the methodology and pedagogical principles of the designers. Although authentic material is often seen as being too difficult for learners, this perceived difficulty can be overcome by providing tools that give learners flexibility to navigate through the material in their own way and in their own time, and by providing specific help at all levels. At the task/activity level, difficulty can be overcome by providing a range of tasks that chunk and unpack the information in such a way that the cognitive processing of learners is not overloaded, thereby making it comprehensible and learnable. In this package, provision is made for both top-down and bottom-up processing, so that learners can work in either mode, or both, but returning them to language at a global level (holistic language) to stress the principle that language is an integrated whole. Tasks begin working from a global perspective but provision is made to seek help at more specific levels such as sentence, phrase, or word simultaneously. Although the laserdisc described here is an Australian English one, the tools described have also been used for developing French and Japanese laserdisc materials. This has been possible through the modularization of the various tools so that they can be incorporated into other programs.

The Tools

In the interests of flexibility, the design of the package is based on the notion of a toolkit, which consists of a number of programs or modules each of which performs a number of small tasks. This enables other packages to take advantage of the functionality provided by each of the modules without being "locked in" to any one author's model (a common complaint levelled at existing CALL software packages).

The Browser

The modules in this toolkit include a "browser" which allows learners the freedom to listen to any segments of the audio material based on functional analyses of language, idioms, interaction sequences, particular speakers, and visual features such as gestures and expressions, or to view visual features such as gestures and expressions from the laserdisc. The browser can be used either as a student tool, an audiovisual dictionary or database, or as the basis for the "help" system for exercises or lessons. The browser also forms the infrastructure for an authoring tool for teachers. In browser mode, there are four display modes. In the first, the screen displays the shape of the transcript with the names of the speakers on the left hand side of the screen, followed by their utterances. Each letter of the utterances is represented by an "x" with probable punctuation used. In the second or partial-display mode, learners can choose any segment of the transcript to view and play by highlighting it, while the third mode displays the full transcript. The fourth mode is only used with the laserdisc as it shows a "visual transcript" of significant actions. As with the audio transcript, the names of speakers, or in this case actors appear on the left of the screen with a description of the action which occurs on the right. In a special field at the top of the transcript screen, a short descriptor of the kind of action is displayed. This descriptor can be called up by highlighting any of the action described in the main screen field. Learners can also use these descriptors to search for and view all examples of a particular kind of action on the laserdisc.

Cassette Deck Simulator

The cassette deck simulating module provides a student record and playback mechanism with which learners can choose any segment of the laserdisc or audio recording to listen to, record their own attempt, and play this back for comparison with the original. This module fulfils a similar purpose to the cassette decks commonly found in language laboratories; the main difference being that access to the sound in either rewind, advance, or playback is almost instantaneous, as is searching for specified segments of sound. This a particular advantage for the repeated replays that serious learners often require, and is especially useful for sensitization work in pronunciation. For more advanced intonation and pronunciation practice, there is also a forward- and backward-build-up feature which allows learners to select a segment of sound to listen to word by word, with learner-specifiable pause lengths between words.

In combination, the browser and the simulator provide learners with the ability to view laserdisc materials as a whole film or as a series of thematically-related segments of the story line which may not linearly contiguous. In both audio-only and audiovisual modes, learners can choose to listen to or view segments of any length from one "word" upwards. In the case of "A Country Practice", the "word" is the shortest segment indexed, though the tools do allow for finer-grained indexing.

User Interface Design

In the design of the user interface, the following points had to be resolved:

- allocation of control to the learner or to the program;
- consistency of design across all tasks, or individualized for specific tasks;
- separation of controls between sound, visuals, lessons, and system navigation;
- graphical or text-only user interface;
- layout of interactive sections;
  - size of fields/buttons,
  - position and number of buttons and fields (convenience vs. confusion),
  - nature of fields (fixed-size field, scrolling, expandable),
  - special effects (fixed, moveable, highlighting, sound),
  - color - highlight and background,
  - screen allocation to display of lesson,
- navigation modes (mouse, keyboard, touch-screen);
- links with other peripherals/facilities (laserdisc, CD-ROM, network);
- links with other screens (transcript, help, feedback, main menu, other lessons);
- entry, exit and change-over (between sound-only and laserdisc) modes;
- any special features/emulations.

In keeping with the philosophy of CELL design outlined above, the decision to keep sound and laserdisc control panels available on screen at all times was made to provide maximum flexibility for learners and teacher/authors. Navigation through the lessons and the browser is controlled either via the pull-down menu system for those learners with a mouse, or via the keyboard for those learners without access to, or unable to use a mouse. It was necessary to provide this flexibility because of the restraints discussed earlier on availability of technology in schools.

Feedback/Response Design

In addition to decisions on the actual interface design, the following aspects of response handling, and the format, frequency, availability, and wording of the feedback available to users had to be decided for both learner and teacher/author modes:

- level of interactivity;
- method of accessing system help (e.g. which key?) vs. task help (e.g. display the question again) vs. global help (dictionary/transcript/translation/searches);
- wording of response to indicate correct vs. incorrect response;
- level of student control;
  - choice of level to work at,
  - choice of advancing regardless of answer,
  - choice of skipping certain steps,
- display mode and activation of alerts/advisory messages;
- display mode and activation of dialogue boxes;
- method and level of access to record keeping of learner sessions.

Hardware and Software Required

Minimum for running either audio-only or audiovisual:

- IBM PC (or clone): XT upwards, running MS-DOS
- headphones/speakers
- microphone

  soundblaster analog to digital/digital to analogue converter (soundcard) — Audio
- several megabytes free space on hard disk — Audio
- audiovisual multi-standard laserdisc player (e.g. SONY LDP-3600D) — Audiovisual
- multi-standard TV monitor — Audiovisual

Desirable: Microsoft (or compatible) mouse (for alternative to keyboard controls).

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PRESENTER'S BIODATA

At the time of this presentation, Debra Hoven taught CALL, Indonesian, Teacher Education, and Applied Linguistics at the undergraduate and graduate levels at the Queensland University of Technology in Australia. She has recently joined the Faculty of Asian and International Studies at Griffith University. Her research interests include computer enhanced listening and learning strategies.

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They're Only Human? How to Treat Computer Assisted Language Learners Right

Lathrop P. Johnson

ABSTRACT

The session is intended as an introduction to ways of optimizing CALL for those getting started and as a cautionary "cause for pause" to allow current practitioners a chance to review what they are doing right and what they ought to be doing better. It investigates the need for "humane factors" in the way teachers implement CALL with their students, particularly in the design or selection, initial implementation, and evaluation areas.

The central design and/or selection criteria include the need for a clear concept of the reasons underlying the use of technology, a clear understanding of the ways students will be able to use it, and a clear plan for monitoring student use.

The section on introducing students to technology will include tried and true techniques with a checklist to be followed. This will also include suggestions for involving colleagues in the undertaking.

The final part will show how to follow student usage closely and how to act on the information gathered to make the implementation both more humane and more pedagogically sound.

PRESENTER'S BIODATA

Dr. Lathrop P. Johnson is Professor of German at Ball State University. His computing accomplishments include the development of **MasterCreate**, a full-sentence answer-processing authoring system used on a VAX mainframe; **CAPTGER**, a content-based computer adaptive placement test in German; and **CompuKomp**, an advanced composition environment for students of German. At Ball State, he serves as chair of the department Technology Committee and as a member of the Sciences and Humanities College Computer Committee, the University Academic Computing Committee (Provost's representative), and the University Multimedia Committee. He recently proposed and was awarded $58,000 to develop a Foreign Language Multimedia Research Lab and Electronic Classroom.

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Dialogues: The French Cultural Interactive Videodisc Project

Christopher M. Jones

ABSTRACT

Dialogues: les Francais parlent d'eux-memes is an intermediate level, interactive videodisc package which presents an integrated approach to the teaching of culture, literature, and language. The hypermedia package includes dossiers on two specific cultural topics — La famille and Les femmes. Each dossier consists of thirty minutes of interviews videotaped in France with French speakers of varied ages, ethnic backgrounds, social classes and regional origins. The material also includes annotated texts — literary excerpts and articles from the contemporary French press — related to the topic, and a computer interface that involves the student interactively with the content. The three elements are linked in a user-friendly environment with both in-class and language lab uses.

PRESENTER'S BIODATA

Christopher M. Jones is a Senior Lecturer in French and Director of the Language Learning Resource Center at Carnegie Mellon University. He is interested in the intersection of technology and the teaching of language and culture. In the last year, Dr. Jones has been involved as an interface and French content consultant on the Discoving French Interactive Project with D. C. Heath and Company, intended for secondary schools. He collaborated on content and built the computer interface for the Dialogues project.

Dialogues project team members are Judith Frommer (Director) and Marie-France Bunting of Harvard, Mary Ann Farley, Christopher M. Jones, and Laurent Patenotte of Philipps Exeter.

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Integrating Voice Into CALL Programs

Jay M. Jones

ABSTRACT

Adding speech output and voice input to computer programs designed to assist in foreign language instruction is becoming more feasible. As voice technology advances, potential effectiveness of computer assisted foreign language instruction increases dramatically. This demonstration presents a glimpse of this potential by using low cost hardware and software to implement beginning level language programs in Spanish, French, and Russian. The approach is to tie many small, adaptable programs together synergetically.

INTRODUCTION

One of the elusive dreams of computer assisted language instruction is a user friendly computer that speaks and understands with precision a multitude of human languages. Affordable speech processing equipment for computers has not yet arrived at perfection, but offers great potential for language instruction.

Getting speech output from a computer is the easier half of the equation. Computer sound cards that can record speech and play it back are of reasonable price and performance. However, making sense of human speech input is not a trivial task for a computer, and speech recognition lags behind expectations. Efforts to "teach" computers to decipher the spoken word have resulted in a greater respect for the miraculous complexity of human language. Despite the limitations, speech recognition technology has advanced to the point of promising significant rewards in a language learning setting.

The **TRES/TROIS/TRI** courseware offers an introduction to the adventure of integrating speech input and output into language learning programs.

DISCUSSION

One scenario for learning a language is to hear it spoken, observe the results, and then to imitate what was heard to try to get a particular response. The **TRES/TROIS/TRI** courseware follows the pattern of presenting speech output together with bitmap graphics and text displays to give a basic introduction to a new language. A choice of speech, keyboard, or mouse input provides practice in that language. Several small programs, each with a relatively narrow scope, focus on a particular aspect of the new language. The programs are modular, and the courseware can be adapted to meet individual needs.

System Requirements

The **TRES/TROIS/TRI** courseware was developed on a 386-SX PC compatible, with VGA monitor, and MS-DOS 5.0. The speech input and output is provided through a Voice Master Key System II, manufactured by Covox.[1]

Description of Covox Voice Master Key

Covox provides hardware and software to add digital sound recording and playback for a computer. It also has speech recognition capability. The Voice Master Key System II used in this demonstration interfaces to the PC through the printer port. A headset comes with the system which contains a microphone for voice input. Speakers are included for speech output.

Before speech recognition can occur, a command must be trained, then linked to a series of keystrokes. When the system recognizes a command, it sends to the computer the series of keystrokes previously linked to that command. Any word can be trained to be a command.

The Covox system has some limitations which affect the way the courseware is structured. These are summarized below.

- Speech recognition is speaker dependent. Each individual using the system must train the system to recognize his/her voice commands. A key to making the system user friendly is to make the training of voice commands as easy as possible.
- Not all words used in the courseware can be recognized at any given time. Commands are organized into groups of between 15 and 20, and only one group can be active at one time. Switching from one group of command words to another is easy, however.
- The system provides limited accuracy. The manufacturer states that from 75% to 95% of the trained commands should be recognized correctly. Steps are taken to compensate for this limitation.
- Short pauses are required between recognized words, as the program is based on discrete word recognition.

Description of TRES/TROIS/TRI Courseware

The **TRES/TROIS/TRI** courseware is implemented in three languages: Spanish, French, and Russian. Three input devices are used: the keyboard, a mouse, and voice. A menu system provides easy access to the various programs which make up the courseware. A main menu allows selection of a category, which in turn presents a choice of programs. Examples below are for Spanish, but the French and Russian versions follow the same pattern.

MAIN SPANISH MENU

1.	TUTORIALS	Provide New Information
2.	DRILLS	Provide Practice
3.	QUIZZES	Evaluate Progress
4.	GAMES	A Bit of Fun
5.	PICTORIALS	Pictures & Descriptions
0.	HELP	Documentation & Hints
A.	SUMMARY	Recap of Program Use

The HELP and SUMMARY options provide information in English. All other options use Spanish primarily.

Figure 1. Main Spanish Menu

The tutorial programs present new information, such as new vocabulary, verb conjugations, and grammar. Icons are presented along with spoken output for each new vocabulary word. The student can have the word repeated indefinitely. When the student is ready, he/she will be prompted to repeat a word three times to train the voice recognition template, which will later be used by other programs to recognize speech. Since recognition accuracy can be a problem with some spoken words, the keyboard and mouse provide an alternate means for input. The words that the system has trouble recognizing can be practiced and retrained.

Practice is a key element in the language learning process, and drill programs provide potentially unlimited practice on the material presented in the tutorials. A sample drill program, titled **TS1**, is described in the next section.

Quiz programs provide useful feedback to the student concerning the level of mastery of the material studied and practiced in the tutorial and drill sections. After seeing the results of the quiz, the student can choose to go back to a previous tutorial or drill, or move ahead to some new information.

Games and narrated pictorial presentations add another dimension to the courseware. Game selections include a Rubic's Cube puzzle and a variation of Master Mind. Pictorial presentations have a series of VGA graphics images accompanied with descriptions in the selected language.

EXAMPLE DRILL PROGRAM: TS1

One of the Spanish drill programs used to practice vocabulary, word order, and gender agreement of noun, adjective, and article is called **TS1**. Four locations, in this case a house, a school, a store, and a church, are drawn on the monitor. At the bottom of the screen are icons representing five objects and five blocks with various colors. The student selects one word from each category, in the prescribed order, and the selected object, with desired color, is displayed in the selected location. The chart below summarizes the options for this example.

OBJECT	COLOR	VERB	LOCATION
El libro	azul	está en	la casa
El anillo	verde		la escuela
El sombrero	amarillo		la tienda
El reloj	rojo		la iglesia
El telfono	moreno		

Several variations of the above theme are possible, such as objects of feminine gender and locations with masculine gender. A quiz program takes many of the same ideas and program structures to test a students knowledge of the material.

Taken by themselves, none of the individual programs that make up the courseware are comprehensive or complex. However, when combined together, the experience gained by going through the tutorials, practicing the drills, and completing the quizzes offers a valuable supplement to a language class.

This courseware barely breaks the surface of the vast field of potential in integrating speech in CALL programs. Progress will be made in speech synthesis and speech recognition. Corresponding progress needs to occur in implementing the technology to the task of more efficiently teaching and learning the languages of the world.

NOTE

[1] Coxox, the manufacturer of the Voice Master Key System II, closed its doors as of July, 1994.

PRESENTER'S BIODATA

Jay M. Jones, B.S.E.E., Utah State University, is a Procurement Engineering Technician at Spectra-Physics in Eugene, Oregon. CALL is his major hobby.

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Intelligent Hypermedia Language Learning Environment: Design Considerations and Future Direction

W. Mary Kim

ABSTRACT

The topic of this presentation focuses on those design components that form the critical part of an effective language learning environment — one that makes effective use of multimedia and artificial intelligence (AI) technology. It is an attempt to reconsider and reevaluate those aspects of design decisions that ensure the delivery of instruction that is comprehensive, flexible, and responsive to learner needs, levels, and variables while allowing for differences in learner styles, approaches, and preferred language learning strategies. An ideal language learning environment is one that approximates total immersion that is nevertheless controlled in allowing for the presentation of authentic materials in a comprehensible form with an effective and adaptive Help System. It would make use of the state-of-the-art technology such as the interactive video/audio and Natural Language Processing.

I will describe the design of a system that integrates such technologies through the examples of the Korean Interactive Video program and the Japanese **ALICE-chan** software developed at Carnegie Mellon University. I will suggest ways in which their features can be integrated in delivering an intelligent tutoring system that would allow for the retrieval of various forms of language information in the light of the U. S. government needs assessment.

Finally, I will introduce a knowledge engineering tool for design and development called the Instructional Design Environment (IDE), that was originally developed at the Intelligent Systems Laboratory of the Xerox Palo Alto Research Center. I will show how design decisions can be documented in the form of a graphic representation through the rationale component. This conceptual design model serves as a research tool through its capability of linking design decisions to a set of explanations about language acquisition and underlying pedagogical principles. IDE supports these endeavors by facilitating the tasks of analyzing, organizing, and sequencing the instructional material.

PRESENTER'S BIODATA

W. Mary Kim holds a Ph.D. in linguistics from the Massachusetts Institute of Technology. She has taught Japanese and Korean languages and linguistics at the University of Hawaii, the University of Maryland, Johns Hopkins University, and George Washington University. While teaching and pursuing Research and Development at the National Cryptologic School, she participated in the pioneering effort to design and develop interactive video courseware to teach colloquial Korean. She is currently Language Training Supervisor at the Foreign Service Institute (FSI), National Foreign Affairs Training Center (NFATC). Her research interests lie in the area of intelligent tutoring systems and hypermedia for language learning.

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A UNICODE IMPLEMENTATION OF JAPANESE, KOREAN, THAI, AND CHINESE IN WINCALIS 2.0

RICHARD KUNST

ABSTRACT

The authoring system **CALIS** 2.0 for Windows (**WinCALIS** 2.0) now supports typing in almost all of the languages and scripts of the world, both for the courseware author and the end-user student. Japanese, Korean, and Thai are the most recent languages to make their **WinCALIS** debut. **WinCALIS** 2.0 is a thoroughly Unicode/ISO 10646-compliant application, not only in terms of character coding, but also in its effort to handle character fonts addressed at their locations on Unicode codepages (as **DOS** handles ASCII), yet which are at the same time harmonious with Windows 3.1's font-handling mechanism.

We have proposed pioneering solutions to many problems, including direct entry and display of codes; character selection by code paging and "point-and-shoot;" clipboard transfer to and from ANSI; character/glyph distinctions, particularly in the CJK "Han" character set; and universal conversions to and from most of the world's existing national and ISO coding standards.

This presentation highlights our solutions, as it demonstrates how to type Japanese, Korean, Thai, and Chinese in **WinCALIS 2.0**. Sample scripts combining these language with audio and video media will also be shown.

PRESENTER'S BIODATA

Richard Kunst is a Research Associate in the Duke University Computer Assisted Language Learning (DUCALL) Project, where he is developing full support for all the languages of the world in **WinCALIS** 2.0.

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Fonts and International Characters on PC/Macintosh

Ilona Lantos

INTRODUCTION

The goal of this demo is to introduce participants to how to get special symbols and international characters into various document formats with an emphasis on applications for the language instructor. Several commercially available products will be demonstrated (WordPerfect [WP] **DOS** and **Windows** version, **WorldFont KeyMapper**, Gamma **UniVerse** with **LanguageLink**, **Fontographer**). The focus of the demo will be on editing existing **Windows** or Macintosh fonts. The font editing program of Altsys Corporation, **Fontographer** will be demonstrated. The presenter will also provide handouts on terminology and concepts important to understanding font basics. Participants will have an opportunity for hands-on experience in font and keyboard editing.

WP DOS

The Keyboard Layout feature lets you reassign or remap WP features and operations to the key of your choice instead of inserting each special character each time with Compose (Ctrl+2 or Ctrl+v).

1. After selecting your newly named keyboard, select the Map option. The keys on your keyboard and the features or operations assigned to them can be seen on the screen. As you move the cursor from key to key on the Keyboard Map menu notice the "Key,""Action," and "Description" headings.

2. Move the cursor to the Action line under the key whose assignment you want to change.

3. Select Compose, which lets you enter a WP character for the key (see WP Characters, Appendix P).

4. Type the WP character set number, then a comma, and the number of the character within the character set (e.g., 141 for an accented e), then press Enter. Repeat this step as many times for as many changes you want to make, and then Exit to return to the Setup menu.

Note: By creating Alt-Macros you can easily switch between two keyboards.

WP FOR WINDOWS

If you use WP for **Windows** and if you want to assign a character from WP character set, copy it to the Clipboard and paste it later. After giving your Keyboard file a name (e.g. demo), enter the characters into Text Box from the numeric keypad and/or from the clipboard. Finally, assign characters to keys or keystrokes. Your keyboard file will be automatically saved as c:\wpwin\macros\demo.wwk, but you can save it onto a diskette too.

Note: By creating Alt-Macros you can easily switch between two keyboards.

ALTSYS FONTOGRAPHER

Among the many capabilities of **Fontographer**, for a language teacher the most valuable one is that it lets you create foreign characters from existing ones or from scratch. It also provides the means to assign your type or graphic image to any key or combination of keys. It allows you to generate PostScript and TrueType fonts that can be installed and used on any platform: PC, Mac, or NeXT. This option is useful if someone wants to use various high quality fonts in a foreign language in a document that is going to be transferred to a different application and/or to a different computer system.

WORLDFONT KEYMAPPER

The **WorldFont KeyMapper** allows you to customize your keyboard layout for any Windows typeface or application. With this program you can use any high quality fonts. For languages having non-ANSI characters (e.g., Hungarian), **WorldFont** provides PostScript or TrueType fonts in limited numbers. You can also edit an existing font with the **Fontographer** and use it later on with **KeyMapper**.

GAMMA UNIVERSE AND LANGUAGELINK

UniVerse is a multi-language word processing package. Even the most complex languages are easy to write and format (Arabic, Persian, Chinese, Japanese). You can mix and match any language combination. TrueType Windows fonts are included with the program.

By using **LanguageLink** utility, you have easy access to the **UniVerse** fonts which include left-to-right languages. **LanguageLink** displays a stay-on-top keyboard with a selection of many keyboard layouts.

PRESENTER'S BIODATA

Ilona Lantos is a Hungarian instructor at the Foreign Service Institute in Arlington, Virginia. She has a B.A. in teaching English as a Foreign Language and in Hungarian Language and Literature. Eotvos Lorand University of Budapest, Hungary, 1984.

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A VOICE INTERACTIVE MULTIMEDIA (VIM) LANGUAGE LABORATORY IN 1994

LTC STEPHEN A. LAROCCA

As an enhancement update to the present interactive video (IAV) laboratory facility, the U.S. Military Academy will implement in fiscal year 1995 (beginning in October 1994) a voice interactive multimedia (VIM) laboratory that adds speech recognition to the capabilities of the 61 student workstations.

The existing IAV laboratory was designed in 1987-88 and purchased in 1989; its installation was completed in 1990. The 63 individual workstations consist of Zenith Z-248 AT-class computers equipped with 20 megabyte hard drives for storage. The video capability comes from Visage overlay cards, which provide full-screen video in conjunction with low-resolution CGA graphics. While use of the present laboratory is constantly expanding, as is the inventory of IAV lessons, there are some important limitations imposed by the age of the equipment and the associated software. The Z-248 computers, for example, are not capable of running the **Windows** operating environment in its newer versions, i.e. Version 3.0 and 3.1. One major inconvenience here is that recent developments in the use of non-Roman fonts with **MS-DOS** computers are inaccessible. As a result, we have good support for French, German, and Spanish text, limited support for Portuguese, and practically no support for Arabic or Chinese.

In a larger sense, the inability to make use of new software and hardware developments makes this update to the IAV laboratory (programmed in 1989) a welcomed event. In this second rendition of the laboratory, a number of items will be carried forward from the present facility. These include more than 60 laser videodisc players and all the laboratory furniture, which remains quite serviceable. An important collection of laser videodiscs, which together with manuals and associated software constitute a library valued at over $300,000, will remain in service. The same is true for a considerable number of IAV lessons developed by the foreign language faculty over the last 4 years using **IconAuthor**. Although a Novell network was developed for the present laboratory, it was never fully implemented.

The projected cost of this upgrade is $350,000; this can be divided up for planning purposes to about $5000 per workstation with $45,000 set aside for servers, software, and run-time licenses. The considerable cost involved in updating and adding speech recognition technology to the language laboratory makes it reasonable to ask what benefits such expenditures will bring to the foreign language program at West Point. Addressing specifically the addition of speech recognition, the new facility will allow many students to practice their foreign language speaking skills simultaneously, one-on-one with a device that gives the student personal and private feedback. This one aspect of the new laboratory increases manyfold the students' opportunities to practice their speaking skills. From a theoretical vantage point, speech recognition fills a present void in technology assisted language learning, by which the computer's output channels permit it to communicate with students via audio enhanced by images and motion video, but the student's output is restricted to tactile (i.e. typed or mouse-clicked) responses.

The goal of the VIM laboratory, then, is to bring greater realism to language instruction, to teach language in a richer context that uses two-way spoken language as well as one-way video to set the stage and progress through exercises in a logical, engaging fashion.

A lesson in the VIM laboratory will be a highly realistic simulated foreign language experience (SFLE). It will be, to the greatest extent possible, an immersion exercise in a foreign culture, carefully assembled to be engaging and successful from the student's point of view. It will be an affordable alternative to foreign travel, accessible to all students. It will focus on speaking, the first goal of foreign language learning in most students' mind.

Given the significant benefits attributed to VIM and the fact that it is but a small logical hop from the relatively prevalent IAV technology, why isn't everyone doing it already? There may be several

answers to this question, but the primary one is that speech recognition technology is still too new. There are at present no widely accepted standards that would permit, for example, the sharing of vocabularies between different types of speech recognition equipment. It is also very significant that there exists no packaged multimedia authoring system at present that includes voice recognition as a input channel.

Albeit new and novel, speech recognition is available today for those who wish to implement it in computer-based language learning systems. In fact, there are actually a large number of choices involved in selecting which type of speech recognition to implement. Speech recognition technology has benefited from the growing acceptance of multimedia computing; speech input is increasingly added as one more feature to differentiate between competing brands of sound cards which, when combined with a CD-ROM drive, make up a kit that will turn an ordinary personal computer into a multimedia personal computer.

Some of these speech input systems are minimalist, in that they purport to do no more than make a computer respond in an obvious way to a small number of common data-entry-type commands. Others, however, are far more flexible and sophisticated, though not necessarily more expensive. In the terms given to us by the engineers who developed the devices, speech recognition systems today can be classified as speaker dependent or speaker independent, and as word-by-word recognizers or continuous speech recognizers.

Speaker independent systems strip out the idiosyncratic differences between speakers; they can use a single set of "templates" for any number of speakers. Speaker dependent systems are easier to make and more prevalent today. They require training, i.e. modeling by each individual user of every utterance in the vocabulary, before they can reliably differentiate between items. For foreign language instruction, where student utterances are very likely to be aberrant to some degree, a speaker independent system with templates constructed by native speakers of the target language is the preferred one.

With regards to the choice between isolated word recognizers and continuous speech recognizers, there are clear advantages to the latter in that they recognize speech the way humans do, with no pauses between words in the stream of speech. Even so, the sharply focused context in which we use speech recognition in VIM lessons minimizes the importance of this distinction; all utterances, regardless of how many words they contain, are treated like a single entity.

Cost is always an issue in implementing new technologies. The proliferation of speech recognizers has brought down their price dramatically in the last two years. In June 1991, a speaker independent recognizer device for **MS-DOS** computer from Scott Instruments, Inc. cost $1500, and the application developer's software kit cost $2000. Since then, Scott has entered into a partnership arrangement with Sierra Semiconductors, a manufacturer of computer games. Today a more capable recognizer card, using the Aria Listener implementation of Scott's speaker independent technology sells together with better developer's software for $300 from Sierra. The price of adding speech recognition to language laboratory machines has essentially ceased to be an obstacle.

While the ideal speech recognition system would be both speaker independent and capable of recognizing continuous speech, the first of these two criteria was judged to be the more significant for the new VIM language laboratory at West Point. A serious drawback with speaker dependent systems is the requirement for each new user to train, i.e. say carefully into the computer's microphone several times, every utterance that the computer must recognize for a given exercise to work properly. As already mentioned, there is a distinct chance that foreign language students might produce less than perfect models of speech for the machine to use, thereby reinforcing their pronunciation errors. Speaker independent systems allow the lesson author to restrict the speech student work is to be matched against to that of native speakers.

Having named Sierra Semiconductors' Aria Listener and mentioned Scott Instruments' speaker independent recognizer technology, I wish to elaborate for a moment on the reason for choosing this particular recognizer. Scott Instruments has put many years' research into developing code that models the human ear's ability to filter out idiosyncrasies in speech. Unlike many new arrivals in the speech recognition market, Scott has placed special emphasis on providing its customers with sophisticated vocabulary development tools, which are of particular importance to developers of foreign language courseware. Sierra's implementation of this same technology into a modern multipurpose sound card adds this company's expertise in

commercial programming to the product of much careful engineering. Sierra's application developer's kit is far more accessible and useful than the original version produced by Scott Instruments, particularly for the **Windows** environment.

While strong in the domains of speaker independence and vocabulary development, the Aria Listener system is not a continuous speech recognizer; it cannot recognize individual words in a sentence pronounced in a normal fashion, without deliberate pauses between words.

A competing product by Verbex Voice Systems specializes in recognizing connected speech; as such, it promises more capability for the intelligent processing of speech than the Aria Listener can provide. By splitting utterances into their constituent words, continuous speech recognizers would allow intelligent tutoring systems to check student responses for "good grammar", i.e. compliance with the morphological, syntactic, and semantic rules of the target language. Intelligent tutoring systems for foreign language instruction, though the focus of much current work on the part of the U. S. Army Research Institute, are in their infancy. There remains considerable work to do before most of the advantages promised by the Verbex recognizer can be brought to bear on the problems of technology enhanced language learning. In the meantime, the fact that the Verbex system is speaker dependent makes it somewhat less useful than speaker independent models, like the Aria Listener.

In summary, the scheduled update seeks to add the following new capabilities to the U. S. Military Academy's foreign language laboratory facilities.

- Non-Roman writing systems, to include Arabic and Chinese.
- Better graphics.
- Access to commercially available multimedia software, including **Exito**, **Khorosho**, and future products of the CIA Language School and Analysas, Inc.
- Voice interactive lessons.
- Digital audio recording and playback, to provide feedback and prompting and to supplement audio available on laserdiscs.

Some tentative software choices have been made to support these new capabilities. The new student workstation will be provided with the following items:

- **DOS** 6.0 and **Windows** 3.1.
- **Authorware** Professional run-time code for access to CIA-Analysas products.
- **WinCALIS** for ease of programming.
- **IconAuthor** 5.0 run-time code for backwards compatibility.
- Scalable fonts for Arabic and Chinese.
- Some tentative hardware choices for student workstations have also been made:
- Host computer equipped with a 486DX/33 processor.
- DVA4000 video overlay board for access to CIA-Analysas products.
- 17-inch monitor.
- 500 MB storage.
- CD-ROM.
- Aria Listener sound card.

Finally, the importance of the local area network connecting the student workstations is acknowledged. With an eye to the future when digital video over a network is more feasible, a 100 megabit-per-second system is being planned. A high speed network permitting storage of video and audio data on servers would give more flexibility to courseware authors and ultimately better instruction to the cadets who are our students.

PRESENTER'S BIODATA

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DESIGNING THE USER-INTERFACE: THE SNOWY RIVER PROJECT[1]

MICHAEL LEVY

ABSTRACT

This paper looks at issues in the design of the user-interface in a CALL videodisc project, based upon the commercial film "Man from Snowy River," and utilizing **Authorware** as the software development tool.

Any authoring system carries a certain conceptualization of CALL that is inherent in its presentational scheme and in the range of options it offers the author, particularly the interaction options that are available. Only the most flexible option, the high-level programming language, is relatively free of such constraints. Anything less than a high-level programming language carries predetermined structures, a condition that can have the effect of filtering the author's initial conceptualization.

With this in mind, this paper examines the Snowy River Project's pedagogical aim, which was to prepare language and cultural comprehension materials based around short scenes from the film; it then relates these aims to the presentation and interaction capabilities offered by **Authorware** and considers to what extent the original aims were realized.

For the Snowy River Project, there was a close match between the methodological goals and the options offered by the hardware and software, although in certain instances, compromises had to be made. This reconciliation that occurs between methodology and technology will be explored in depth and the resultant solutions will be discussed.

BACKGROUND: CONCEPTUALIZATION

Hardware

An author's conceptualization of CALL materials is shaped not only by the author's methodology, but also by the hardware and software that are used to realize the conceptualization (Mackay 1988; Lian 1991). A primary decision is whether to work within the constraints of existing hardware, or to "stretch" the capabilities of the hardware so it more closely approximates the author's requirements. Morgenstern suggests "adapting and deforming" the technology to meet "significant aspects of the goal system" (1986). Under most circumstances, however, and often due to lack of sufficient funds, CALL authors have had to rely on existing, commercially available hardware components. In the realm of microcomputer CALL, this has meant adhering to a small number of *de facto* standards, most recently the IBM style PC and the Apple Macintosh style computer (Lian 1991).

Software

The capabilities and limitations of the authoring software also help to shape an author's conceptualization of CALL materials. Early authoring systems were the most restrictive and only allowed for a limited range of activities (Underwood 1984) and they "precluded any really original use of the resources of the computer" (Kenning and Kenning 1984). In more recent years authoring systems have become more powerful and more flexible although they still retain predefined structures or objects and a limited range of interaction possibilities. Mackay maintains that an authoring language often reflects a certain educational philosophy to the extent that "a quick glance at the screen is often sufficient to determine which authoring language was used to create

which course" (1988). Only the most flexible option, the high-level programming language, is relatively free of constraint.

Because of intrinsic limitations in the hardware or software, or the complexity of programming needed to create a certain function, some compromise usually has to be reached between the original conceptualization and the final implementation. Hardware and software considerations, therefore, have some effect on the nature of any CALL materials produced, possibly beyond that planned for in the original conceptualization. This paper examines this question in relation to an interactive videodisc project based upon a commercial film, "The Man from Snowy River."

ORIENTATION: THE SNOWY RIVER PROJECT

Methodology: Video, Videodisc, and the Audience

The value of using video and videodisc in language teaching has been elaborated at length elsewhere (Altman 1989; Coleman 1987). In general terms the use of the video/videodisc medium is attractive for three reasons: it serves to illustrate connections between language use and the real world, it provides the simultaneous use of two channels of communication to support comprehension, and it presents language in context, which, for this project in particular, related heavily to the cultural context — Australian settings, characters, customs, and language.

Work by Altman provides a more detailed framework. Firstly, Altman (1989, 4) provides a model for pedagogical activity involving video. The model has three interdependent levels of expression, each with two linguistic aspects shown in parentheses: oral language (sounds and segmentation); written language (semantics and syntax); and culture (systems of discourse and systems of culture). The process of comprehension can involve each of the six linguistic aspects separately or in combination.

In a second paper Altman (1990) describes the role of schema theory and discourse analysis in video pedagogy (see also Gagné and Dick 1983, 279). This orientation was particularly important in designing the questions for the Snowy River Project, which aimed at utilizing the student's background knowledge and expectations of events and relationships in the film.

Overseas students often arrive in Australia with very limited knowledge of the country, its history, and its culture. Yet most students intend to live and study in Australia for two to three years. It is desirable, therefore, to help students to better understand colloquial Australian, and to increase their awareness of some Australian traditions and stereotypes. In exploring these ideas more fully they build a more complete understanding of modern day Australia. The language level of the materials was aimed initially at intermediate level, approximately IELTS (International English Language Testing System) level 5.5, the English entry level for students at Bond University.

Content: "The Man from Snowy River"

"The Man from Snowy River" is one of the most popular Australian verse-stories. The ballad was written in 1890 by A. B. ("Banjo") Paterson, who also wrote the song "Waltzing Matilda." For many Australians, "The Man from Snowy River" conjures up the myth of the bush, the wild, inhospitable landscape, and the pioneering spirit of the early Australians. The film of the same name was released in 1982 and is loosely based upon the poem. For the language student arriving in Australia from overseas, the film provides an excellent point of departure for discussing the language, history, and culture of the country.

The prototype Snowy River Project utilizes four one-minute scenes from the film. The scenes were chosen primarily on the basis of the language used, the characters involved and the relationships between them. In the first scene, two older people are discussing the young protagonist (Craig); in the second scene, Craig is being taunted by two workmates; in the third scene, Craig meets the romantic heroine (Jessica) for the first time; and in the last scene, Jessica argues with her father about the role of women. The four scenes provide a cross-section of characters, moods, and relationships that relate to language and culture — these issues are then highlighted and explored through the questions that are presented.

Multiple-choice and gap-fill questions are used to focus the student's attention on oral language and cultural factors. In both cases feedback is given. When students are working on a question they have seven option buttons available to them: Scene (film with sound); Video (film without sound); Audio (sound only); Transcript; Hint (text feedback); Dictionary (dictionary for all scenes); and Quit. Buttons may be activated in any order and as many times as required.

Other features of the program include animated graphics of horses on the opening screen and a series of introductory screens on how to use the program. The poem is also reproduced on the screen to background music from the videodisc. The prototype Snowy River Project is now complete. In the future it is hoped that questions will be developed for eight to ten scenes at two proficiency levels. A professional reading of the poem may also be included.

Technology: Hardware and Software

The hardware used for this project was a Pioneer LD-V4200 videodisc player (NTSC standard) controlled by a Macintosh Quadra 700 computer. The hardware was chosen primarily on the basis of local availability and the fact that the film, "The Man from Snowy River" was available in CLV videodisc format.

The authoring system **Authorware Professional**, abbreviated to **Authorware** in this article, was used for development work. This system was chosen because its functionality matched the goals of the project and it was available locally. A unique characteristic of **Authorware** is its icon-based development environment. By positioning icons on a course flow line, then specifying the parameters of each icon, the branching structures and the student-computer interactions are realized.

Multilevel modular design techniques are also supported in that once a sequence has been designed (e.g., a question structure) related icons can be combined into a unit that may be copied and used elsewhere.

RECONCILIATION: METHODOLOGY AND TECHNOLOGY

Hardware

The use of available technology imposed certain constraints on the design of the program. In isolating a segment of speech for comprehension work, for example, the combined characteristics of the Constant Linear Velocity (CLV) videodisc and the LD-V4200 player imposed an immediate constraint: a time number search capability accurate only to the nearest second. Thus, there had to be a clear pause in a stream of speech at the start and end points of a video or audio segment. Of course this contrasts with the level of accuracy available with CAV (Constant Angular Velocity) videodiscs which may be addressed by frame number. However, now that at least one videodisc player, the Pioneer LD-V8000, is able to provide frame-accurate search, freeze frame, and variable speed play for CLV discs, interactive CLV is certainly possible. Whether **Authorware** would support such an arrangement is not presently known by the author. Nevertheless, in terms of the goals of the Snowy River Project these constraints did not really interfere with the design in any way. Comprehension questions focused more on understanding the broader context than intensive listening comprehension work.

Software

For this paper, two of the most important aspects of **Authorware**'s design environment as it relates to the Snowy River Project are considered: the authoring interface and answer analysis.

The authoring interface is based upon the metaphor of the flow chart. Traditional flow chart symbols such as the decision icon and the process or step icon have their equivalents in the 11 icons provided by **Authorware** and these icons are used to develop the flow chart. The flow chart metaphor with its loop and conditional constructs accords well with the kind of branching structures required in the project. Branching structures that allowed flexible question by question presentation, answer evaluation, and feedback could all be written with relative ease.

It is worth noting, however, that when the computer is used as a tool rather than a tutor, the flow chart metaphor becomes less relevant. In such a case the "navigation through space" metaphor of hypertext might be more appropriate (McKnight, et al. 1989). Hypertext provides the ability to link or browse large amounts of information, without necessarily any evaluation of user input taking place as in a tutor. When compared with the design environment provided by **Authorware**, the hypertext arrangement is much less structured.

Answer analysis is provided through **Authorware**'s nine different answer options: text, click/touch area, move object, pulldown menu, keypress, pushbutton, conditional, time limit, and tries limit. It is the parameters of these options that determine the nature of the human-computer interactions that are possible. In the Snowy River Project, it would have been advantageous to ask open-ended questions requiring comment on why characters in the film speak or act as they do. But restrictions in the answer analysis capabilities of the authoring tool prevented this (Park 1993). As a result, multiple-choice and gap-fill type questions were the predominant choice for the Snowy River Project, corresponding to the click/touch area and text answer options.

Given the number of possibilities for text entry and the difficulty of dealing with unanticipated text answers, the text answer option was inevitably limited. **Authorware** does not provide error mark-up features allowing text to be marked to indicate the nature of the error, possibly because **Authorware** is a general authoring system not designed specifically for language use — language-specific authoring systems tend to have more sophisticated mechanisms available for marking text (Pusack 1983). Nevertheless, even the most sophisticated systems employing artificial intelligence techniques lack the necessary power to derive meaning from text input in a way that would meet the need described above.

CONCLUSION

In discussing the methodology underpinning the Snowy River Project and the ways in which certain desirable features are constrained by the capabilities of the hardware and software, local and more far-reaching problems arise relating to the state of tutorial CALL at the present time. Locally, funding constraints prevent potential solutions being investigated. The difficulties in this project, and others like it, also point to more far-reaching and fundamental concerns in CALL, funding and compatibility issues notwithstanding. Most important is the problem of achieving answer analysis of sufficient quality for unanticipated text input, the problem highlighted by Pusack a decade ago. Nevertheless, careful selection of hardware and software tools initially, especially with a view to their strengths and weaknesses in relation to a specific application, can significantly reduce detrimental interference through the development process.

NOTE

[1] The Snowy River Project prototype was completed as a joint project between Bond University and Griffith University: the development was funded by the Centre for Multimedia Research and Development, Griffith University. The project was supervised by Michael Levy and James Garton with Bill Park as Research Assistant and Programmer.

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PRESENTER'S BIODATA

Professor Michael Levy's main research interest is computer enhanced language learning, a subject about which he has produced a video and written two books, a bibliography, and a number of published articles. He has just completed his Ph.D. thesis in his field entitled, "An Inquiry into the Conceptual Frameworks and Working Methods of CALL Authors," which endeavors to describe how CALL authors conceptualize CALL as evidenced by an extensive survey and the characteristics of the CALL materials they have produced. He is also the General Editor of *In-Call*, the Australian Journal of Computers and Language Education, that is now in its eighth year of publication.

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AUTOMATICALLY NORMING WRITING

DONALD LORTIZ

ABSTRACT

Approximately two thousand English teacher-edited essays of children in grades K-6 from two school systems were automatically parsed in two passes using the **ENGPARS** system. The first pass identified grammatical and lexical lacunae in the parsing system. These were patched and the second pass reparsed the essays with grammatical acceptance rates ranging between 70% and 95%.

The trees and parse-paths of the accepted sentences were used to construct competency analyses on some 1,000 grammatical variables as described in Loritz and Zambrano (1990). In that study the **ENGPARS** system profiled the syntactic competence of deaf learners of English, but utility of the results was limited for want of comparable normative data.

This study addresses that limitation by establishing comparative norms for (native) English writers in grades K-6. The results establish the feasibility of large-scale, automatic norming and analysis, but can only be considered provisional in light of several problems which must be addressed by future research.

- Variable contributions of teacher-editing must be controlled.
- Norms for age-matched ESL learners should be obtained.
- Sources of topical and semantic variance need to be controlled.
- Data glut of 1,000 grammatical variables should be reduced to a form suitable for human consumption (the human factors problem).
- Rhetorical and semantic variables should be added to the analysis.

These problems will be discussed.

PRESENTER'S BIODATA

Donald Lortiz is Associate Professor of Computational Linguistics at Georgetown University. He received his Ed.D. in Applied Psycholinguistics from Boston University. There he studied neural networks with Stephen Grossberg and Augmented Transition Network (ATN) grammars with Bruce Faser, co-inventor of the ATN algorithm. These two perspectives on language have absolutely nothing to do with each other, and induced a schizophrenia which still characterizes Loritz's work. This paper exhibits his serial personality.

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DESIGNING CLASSROOM PRESENTATIONS USING MULTIMEDIA TOOLBOOK

MARY ANN LYMAN-HAGER AND LINDA MOEHLE-VIEREGGE

INTRODUCTION

Researchers in French and German of the IBM-sponsored Language 3 Initiative at the Pennsylvania State University have developed simple, practical classroom presentations using multimedia technology that are pragmatically attractive, immediately useful to instructors, and visually interesting and pedagogically effective to students. Classroom presentations, deriving from two completed Multimedia **ToolBook** software projects (in the case of French) and from videodisc footage plus Multimedia **ToolBook/Compel** (in the case of German) extend the possibilities beyond the organization and augmentation achieved by traditional advance organizers (Ausubel). Exploring various authoring tools such as **ToolBook** and **Compel** has led to an enhanced realization of the importance of utility, visual impact and effectiveness, adaptability of materials, as well as an acknowledgment of the technical hesitations of the teaching assistants and learners who will use the materials in the classroom This presentation will present an overview of the Language 3 Initiative, the French and German programs created with the authoring tools mentioned above, and considerations of design that accompanied the development of these classroom presentation tools.

THE LANGUAGE 3 INITIATIVE

The Language 3 Initiative had its origins in the College of Liberal Arts of the Pennsylvania State University, with a group known as the ICLL (Interdepartmental Council for Languages and Literatures) in 1991. A small subset of the ICLL group was appointed to determine what could be done with technology — to determine where it was appropriate and helpful, especially in the undergraduate language course sequence. We proceeded from common experience — that is, from the observation that the undergraduate language student is often not motivated to continue language study. How could technology, in particular, computer assisted instruction, video, and interactive video bring speakers from afar into the quasi-reality of the classroom? If this could be done, would it make a difference in student learning?

The Language 3 Initiative thus focuses on retaining the interest and motivation of third-semester language learners and enhancing their competencies in listening, reading, and writing through the appropriate use of instructional technology. The third semester is pivotal in that it is the final semester of language required by most colleges at Penn State, and many students end their language instruction at this point. The Initiative involves the Departments of French, German, Spanish and Portuguese (Spanish section), and Comparative Literatures (Japanese section) and is in its second full year of operation.

The Initiative had its early beginnings in Penn State's acceptance into the IBM-sponsored LLAMA (Language Learning and Multimedia Applications) Consortium, announced in late 1991. Through the Consortium, Penn State received five multimedia stations in the summer of 1992, complete with laserdisc players and built-in CD-ROM drives. Additionally, Penn State received access to software created by members of the Consortium, in some cases in pre-release form.[1] The machines arrived pre-loaded with multimedia software and with standard word processing and spreadsheet software. Four are placed in the Sparks Learning Center for student use, and one is used for development of software for the Initiative by the language coordinators and head TA's.[2]

1992-93

During the first year, curricular planning, research and classroom design, training for TAs and faculty, installation of 40 computers in departmental offices in the various departments, and selection of materials were the prime focal points. Bi-weekly meetings with coordinators and lead TA's occurred throughout the year, and several day-long seminar-workshops cosponsored by the Center for Academic Computing enabled participants to become acquainted with the software and hardware chosen by coordinators and project leaders. Topics of the seminars included multimedia authoring tools, spreadsheet (data and record keeping) and word processing applications, and video/interactive video. Visiting lecturers Nina Garrett of George Mason University and James Noblitt of the Institute for Academic Technology (University of North Carolina, Chapel Hill) came to Penn State for a two-day lecture series focusing on second language acquisition research using technology. Coordinators and head TA's presented at the Northeast Conference on the Teaching of Foreign Languages, and the Project Director presented at Open Houses for the Classroom Office Building, the Board of Trustees, the German CIC Coordinator's meeting. Researchers connected with the project won a teaching award from the Provost's office at Penn State for curricular innovation. During the summer, the Head French 3 TA, Joanne Burnett, presented the Initiative to IBM Executive Bruce Claflin and others from the College of Liberal Arts. Research on two doctoral dissertations in French/second language acquisition began in the first year, and more will likely follow.

Installation of security systems and local area networks occurred in the spring and summer of 1993, preparing the three classrooms for use in the Fall of 1993. Due to delays in constructing and equipping the classrooms, the classroom implementation phase occurred in Fall 1993 rather than Fall 1992. But these delays enabled researchers to develop more fully the curricular strategies to be employed and allowed for the completion of software to be used in the Initiative, **Une Vie de Boy** (reading comprehension), and **Ça Continue** (listening comprehension).[3] Project Director Lyman-Hager and CAC programmer Morris Weinstock received a stipend from the National Foreign Language Center at San Diego State University to perfect a reading shell that could be used for any language, based on the **Une Vie de Boy** program. The Language 3 Initiative entered into a formal partnership with Heinle and Heinle to test software in its pre-release form, enabling us to have access to **Système D**, a writing assistant for the French language. (**Atajo** and **Quelle**, Spanish and German versions of the same program, will be made available to Penn State.) In addition, the Initiative began working closely with Undergraduate Education at Penn State to create a "seamless interface" between the classroom and laboratory: students who wish to continue working on the computer with a classmate or with the interactive video they have seen in class may do so in another centrally-located learning center. In addition, undergraduate education language tutors use the technology classrooms in the evening to help students with languages and with the software that supports teaching. This has enabled the classrooms to be used to capacity, even when no classes have been formally scheduled.

1993-94

In the Fall of 1993, fifty four sections of French 3, Spanish 3, Japanese 1 and 3, and German 3 scheduled classes once a week in technology language classrooms (Sparks 2, 3, and 11). Work on the classroom continued into the Spring of 1994, with the installation of high-quality wall-mounted speakers and audio and video cassette recording systems for multimedia presentations. Six intensive three-hour seminars are held at the beginning of each semester to prepare teaching assistants to use the classrooms. Topics for the seminars, taught jointly by the Project Director and the Project Administrator, and by personnel from the Center for Academic Computing, included Multimedia **ToolBook**, the Internet, Microsoft applications in **Excel** and **Word**, Video and Interactive Video. Coordinators in each language then conducted separate training seminars for language-specific applications, such as *Montevidisco* (Spanish interactive fiction simulation, developed at Brigham Young University) and **Une Vie de Boy** (French reading program, developed at Penn State). In the fall, final installation of the 40 faculty/TA computers in the various language departments was completed, and these computers were placed on a local area network. All of the 27 classroom computers were likewise placed on the campus backbone. Training for faculty and TA to use both networks was provided by the Center for Academic Computing. This training included training in the Internet, Access Clients on the Pennsylvania State University mainframe, and seminars in the use of multimedia presentation tools, primarily, Multimedia **ToolBook**. As the semester progressed, several of the faculty

and graduate students expressed interest in using Compel, which is based on Multimedia **ToolBook**, to enhance the quality of the classroom presentations.

THE FRENCH DEPARTMENT: DEVELOPMENT OF THE SHELL APPROACH TO CLASSROOM PRESENTATION

The listening shell used in French derives from the program **Ça Continue**... (Lyman-Hager 1993) and is written using Multimedia **ToolBook**. It utilizes a combination of programs currently adopted by the French section of the Language 3 Initiative (**Système D**, the French writing assistant software by Heinle and Heinle, and a cut by Francis Cabrel, "Encore et Encore," from the PICS4 videodisc, *Télédouzaine*).[4] The Cabrel piece has withstood the test of time: students at various levels at a variety of institutions where the software developer has taught have found the lyrics motivating— the topics deal with broken relationships and healing — and the presentation style of the artist allows for an easy understanding of the song's words by various levels of language learners. This **ToolBook** shell could be easily adapted to German, Japanese, Spanish, or any other language, for that manner, substituting appropriate videodisc footage, the appropriate flag (which turns into a video window), and the corresponding writing assistant software, **Système D**. (In the case of Spanish and German, Heinle and Heinle has developed tools similar to **Système D** for German and Spanish — **Quelle** and **Atajo**, respectively). The virtue of the original Cabrel multimedia program is that it integrates classroom small-group activities (prelistening, listening, and postlistening) with writing activities specifically tailored to the video. The prelistening activities focus the small group's attention on establishing a mutually-experienced context or backdrop for the action of the particular section of video the group is asked to view. The listening activities draw the learners' attention to specific words-in-context, and the program provides glosses for particular words and expressions, while the postlistening activities ask the groups to hypothesize about the future events suggested by the video narrative. All of these small-group class time activities may be oral or written, with a combination of the modes suggested in the software's instructions to users. Finally, the program gives users a writing task and instructs them to click on a box to access **Système D**. Exiting the **Système D** program on completion of the suggested essay will bring the user back to the main program. This same sequence of events could be used with videodisc footage in any language, with the addition of the proper writing assistant software as a "link" to the main program.

The reading shell used in French is more self-contained and derives from the program **Une Vie de Boy** (Davis, Lyman-Hager 1992). It is written in Multimedia **ToolBook** and employs digital audio, French-English and French-French translations, cultural and grammar notes, and relationship glosses tied to specific portions of the original text, the 1956 Cameroonian novel, *Une Vie de Boy*. The new version of the program has been developed as a shell for reading for all languages, and, additionally, allows for all types of multimedia textual glosses, in addition to those of the original program. It is especially designed for use by the other languages of the Language 3 Initiative. Unlike the earlier program, **Une Vie de Boy**, the developers have acknowledged the need for the program to use on-line dictionaries published by second parties in various languages. This feature obviates the necessity for extensive glossing by the program developers, although some customizing of glosses will undoubtedly be necessary.

THE GERMAN DEPARTMENT: DEVELOPMENT OF THE SHELL APPROACH TO CLASSROOM PRESENTATION

A "shell approach" to instruction was found to be desirable in the German language program for two primary reasons: first, as the Language 3 Initiative began, there were few German programs available or known to the project participants that could be immediately implemented and integrated into the program. Second, it was an attractive idea that existing authoring tools could readily and easily be used to create presentation shells adaptable to any language and to most any materials and media already familiar and available to instructors. Multimedia **Toolbook** provided the basis for such a shell. A videodisc from the PICS project provided the source for the focal learning material. These were, of course, not chosen randomly.

Multimedia **Toolbook** was a software package accessible to all those involved in the project, and demonstrations and training sessions for this software were offered regularly within the framework of the L3 Initiative, as well as in extracurricular training

sessions offered at the University. Furthermore, visual materials already available to the project participants through PICS (video film clips, videodisc materials) could be utilized and easily imported with Multimedia **Toolbook**. This flexibility and choice in materials, the accessibility to training and to other colleagues familiar with the program, as well as the potential of cross-language adaptability proved crucial in the choice of this authoring tool.

Considerations in the choice of the learning material were multidimensional. Several factors, both technical and nontechnical, influenced the choice of the film clip for presentation, as well. "Der erste Schultag," a brief cultural video from PICS, was more than just visually interesting. The film was appealing on several levels: since most every individual can recall the experience of beginning school, the film was personally appealing, and because the first day of school is a big event in cultures around the world, its appeal was universal. Yet, as the film depicts, the customs associated with beginning school in Germany are culturally unique. The topic of schools/educational system is also included as a an important information segment of most every language program. And last but not least, the depiction and speech of children in the film affords psychological appeal: adult language learners feel less intimidated by the simple speech of the children.

Several technical considerations also played a role in the selection of the videodisc material. The length—better, the brevity of less than two minutes — of the "Schultag" segment was especially in keeping with one of several helpful PICS guidelines for using video in instruction: apportion ten minutes of class activity for each minute of video (S.4, PICS Videoguidelines). The segmentation of the film, the video's sequential glossing and its dual-speed audio tracks were also deciding features. The short segments comprising the film provided natural breaks and stops for treating the material in manageable bytes. A dual soundtrack, one with speech at a natural speed, another with slower, simplified speech, accompanied each segment; this duality allowed for adaptation to beginning versus advanced listening audiences. Clips appeared with — as well as without — subtitles to the corresponding spoken text.

The melding of Multimedia **Toolbook** and "Der erste Schultag" resulted in the creation of a short presentation entitled "Schultüte." The presentation incorporated a sequence of video windows which provided the visual enhancement of the topic; an audio track was supplemented by a transcription of the spoken text, further glossed with "hot-worded" lexical items. Once this shell was created, any material provided by PICS could be adapted to and imported into this type of presentational format.

While utility and audiovisual impact have been primary motivations in using such a shell, the argument for pedagogical effectiveness is supported in the creation and use of shell presentations as a type of or even replacement for the traditional advance organizers found in language classes. In the initial conception of "Schultüte" exercises were designed to accompany the presentation for expansion and reinforcement, with the goal in mind to further develop these exercises as an interactive part of the presentation that could provide the learner with instant feedback.

Technical hesitations on the part of the instructors have been addressed in several ways. Beside the regular training seminars offered to the teaching assistants each semester, within and parallel to the Language 3 Initiative, instructors have been encouraged to explore the "Schultüte" shell and other software programs on their own. Their experimentation has resulted in individual and very practical creations that they share with others: crossword puzzles and grading packages using **Excel**, lesson plans organized with **Compel**, popular compact disc material enhanced by transcription and glossing using Multimedia **Toolbook**. They are eager to explore the adaptability of other shells and tools such as **Quelle** (already we imagine how useful this will be for the completion of verb lists included in our language learning packets) and **Dasher**, as they become available.

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NOTES

[1] Much of the software coming from the Consortium has been significantly delayed, perhaps by the 1993 reorganization IBM and the temporary reduction of support for the Consortium.

[2] Project Director (Mary Ann Lyman-Hager) and Language Coordinators (German: Linda Moehle-Vieregge; Japanese: Reiko Nemoto and Chiyo Konishi; and Spanish: Cathy Anderson.) Project Director Lyman-Hager also serves as the coordinator for French. John Harwood and Kathryn Grossman are Project Administrators. Graduate assistants include Joanne Burnett (French), Christiane Eydt (German), and Maria Jésus Amores (Spanish). The Spanish and Portuguese Department is searching for a language acquisition specialist in Spanish to replace Lynn Gorell, who is now at the University of Michigan.

[3] Initially the project called for five technology classrooms. Because the number of classrooms was reduced to three, classes could only be scheduled once a week. Instructors have expressed a desire to have the classrooms available more frequently to allow for curricular flexibility. In addition, instituting language requirements in additional colleges will increase the need for more technology classrooms devoted to language instruction.

[4] Project for International Communications Studies, the University of Iowa, Iowa City, Iowa.

PRESENTERS' BIODATA

Mary Ann Lyman-Hager, Ph.D., is Assistant Professor of French, Penn State University, Project Director of the Language 3 Initiative, and Faculty Coordinator for French for the Language 3 Initiative. Her areas of specialization: second language acquisition and technology (listening and reading comprehension).

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CLOZE (FILL IN THE BLANKS) EXERCISES IN WINCALIS AUTHOR 2.0

MOHSEN MAHDAVI-HEZAVEH

ABSTRACT

In multilingual **WinCALIS Author** 2.0, we have developed a new design for the Cloze (Filling the Blanks) exercise, which parallels other tasks implemented in **Author**. Since we have more than one blank in each Cloze task, it is treated as a supertask with many subtasks for different blanks.

The new design implements more features than **Author** 1.1. Some of these features are as follows.

- Implementation of distractors.
- Ability to have more than one correct answer for each blank.
- Ability to have incorrect, neutral, etc. answers for each blank.
- Ability for the user to view the distractors in **Author** before saving the script.
- Indexed distractors so the author can have the same word in different parts of the text marked as answer. For the user, these will appear as different entries in the distractor window.
- Ability to add wrong answers to the distractors and randomize them so the user can be distracted reasonably.
- Ability to have noncontextual clues not contained in the text of the Cloze exercise.
- Allows the author to design feedback to the user for each right or wrong answer.
- Option to fix the length of all blanks in the exercise to prevent users from guessing based on the length of the blank.
- Show Distractor option gives the author flexibility to hide or show the distractors.
- Users can have more than one Cloze exercise per script. This will make it possible to have many short, one sentence Filling the Blank exercises.
- Answers have the option of default correct and incorrect feedback and clue directions.
- Users can choose the number of answers in each distractor line.

PRESENTER'S BIODATA

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SHAPING TECHNOLOGY TO PEDAGOGY: "EXPLORE & CELEBRATE!" A CROSS-CULTURAL MULTIMEDIA PROGRAM

ISABELLE MARIGNAC

ABSTRACT

In a field like ours which is dedicated to enhancing pedagogy through technology, the "high-tech bias" is constantly lurking. The wonderful potential of multimedia and computers for second language teaching, the new technological achievements and improvements never cease to astonish and enchant teachers, and with good reason. While it certainly is meaningful to explore the full potential of the latest innovations, the excitement of doing so nevertheless tends to create fashionable trends in instructional programs where the newest technology sometimes seems to take over from a focused pedagogical purpose.

Explore & Celebrate! is a cultural exploration of holidays in Spain, France, Germany, and the United States for the elementary and intermediate levels. This program, which will be demonstrated, uses the full potential of multimedia for the teaching of culture and language and yet at the same time keeps the technology down to the limits of its pedagogical usefulness. The following features of **Explore & Celebrate!** will be highlighted:

- Descriptive texts are streamlined since meaningful information arises from their interaction with the two other elements of the multimedia presentation: the authentic visual and aural documents.
- Voice recordings of native speakers are simply used for the pronunciation of cultural keywords since the program's purpose is learning about culture, not practicing listening comprehension.
- Video clips are used only when they convey more cultural information than a stile picture does.
- An alternative to an on-line dictionary is used to promote a strategy of global comprehension of texts in the target language.
- A threefold self-test (working on receptive skills, on written production and oral production) is available to ensure that the student's free exploration ultimately results in a real knowledge of the assigned holiday.
- The design of the program is characterized by openness and connectedness, a conscious orchestration of ease of navigation but also some linearity.

PRESENTER'S BIODATA

At the time of this presentation, Professor Isabelle Marignac was Coordinator for New Technologies in the Department of Foreign Languages and Literatures at Virginia Tech, where she also taught French and German. Besides **Explore and Celebrate!**, she is developed a French Civilization program for a two-semester course as well as software for the learning of grammar in a multimedia, multicultural environment.

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Interactive Expeditions Into English

Joseph A. Martineau

ABSTRACT

Expeditions Into English is an audio-interactive tutorial on a completely colorized **HyperCard** platform, designed for beginning English as a second language (ESL) students. **Expeditions** has 12 units divided into 41 lessons which also contain numerous sections. *Expeditions into English* was originally a beginning ESL book developed by Brigham Young University and Prentice Hall and is currently being used in BYU's English Language Center.

This version of **Expeditions** is much more than a computerized version of the book. It utilizes scanned graphics from the book, but they have been overhauled and colorized. It takes most of its dialogs and exercises directly from the book, except for a few original sections. Some of the lessons (i.e., maps, menus, place settings, and rooms of a house) are presented in novel ways to give the students more variety.

In **Expeditions**, students can practice pronunciation by using a record/compare module to compare their voice with original recordings and actually hear themselves participate in the word or sentence. **Expeditions** utilizes a practice/evaluation quiz package for nearly every card, using text, PICTs, and sound from that card.

Expeditions addresses screen design, human-computer interface, and aesthetics, and would be of interest to those exploring the possibilities of the Colorized HC XCMD in an educational setting.

PRESENTER'S BIODATA

Joseph A. Martineau is a Senior in Linguistics, minoring in Computers and Language at Brigham Young University, planning to graduate in April 1994. He has been programming in **HyperCard** since January 1991. He has been working as a **HyperCard**/Materials Developer for the Brigham Young University Linguistics department since January 1993. Joseph has developed **Expeditions Into English** under the direction of Dr. Glen W. Probst of the BYU Linguistics Department.

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STUDENT INITIATED SOFTWARE FOR BEGINNING SECOND LANGUAGE PROGRAMS

MARCEL MATTE AND EDWIN JANZ

INTRODUCTION

Within the Canadian context, the teaching of second languages has in recent years been undergoing tremendous changes due to recommendations arising from the National Core French Study conducted by the Canadian Association of Second Language Teachers. This Study examined the teaching of French as a second language in any program that was not immersion in Canada. The objectives of the study were:

a) to examine the politics, the programs, and the activities associated with the teaching of Basic French in Canada.

b) to gather the ideas, experiences and research on the planning and organization for the development of curriculum.

c) to examine pedagogical approaches, the training of teachers, and on the methods of evaluation.

d) to identify means of improving the Basic French in such a way that higher achievement levels at the end of the program would become the norm.

Of the host of recommendations arising from this study the ones which gained the strongest foothold in the educational community were those dealing with the communicative/experiential syllabus. The essence of these recommendations is that work assigned to students in second languages should be meaningful to those students and not be created in a linguistic vacuum that has no relevance to their everyday lives.

The Modern Language department at River East Collegiate saw the introduction of technology as a means of achieving the goal of communicative/experiential learning. The use of computers within the second language classroom demonstrates to the students that languages are part of the technological revolution. It is important to stress that the need for a wide range of second languages is increasing. The Collegiate received special funding from the federal government through the Department of the Secretary of State for evaluating how commercial computer software is effective in helping achieve the goals set out in the National Gore French Study.

The work we were doing in this field led us to become a BETA test site for the **Hugo** grammar verification program created by the Logidisque company of Montreal. Students are now able to do all their written work using the computer since they have ready access to both the necessary hardware and software. To make this a reality for students the teachers involved had to change their teaching styles. What this meant was that while a teacher was teaching a grade 12 class, there might be up to sixteen extra grade 10 or 11 students in the room working on the computers. Work had to be structured in such a way that some students could utilize computers while the others were working on different tasks. Teachers also had to allow access to the computers during students' lunch hours and study periods.

This introduction of technology into the second language classroom provides the teachers with support for proofreading, remedial grammar exercises, pronunciation drills and vocabulary exercises. However, little of the available software actually engages the user in meaningful communication. Since the goals of the Canadian curriculum stress meaningful communication, we felt that another use of the technology had to be found. This led to the creation of the "student initiated software" project.

The Computer Science department in the school is also searching for new ideas for its programs. As part of the program for the grade 10 Honors classes (Advanced Placement) students write stories which they illustrate, animate, and embellish. This provides them with practical application of the abstract

concepts. It requires, however, two weeks of computer science class time in order for groups to be formed, for them to write their story, and to draft the illustrations for these stories. This time is more effectively used if the work is done in language classes. At River East Collegiate, discussion during the last two years between the computer science and the modern language teachers quickly showed that writing children's stories in the second language classroom and handling them over the computer science students for the creation of software could be beneficial to both programs. The language students were now working on projects that were going to be seen and used by others, thereby creating a communicative experiential environment in the classroom. The computer science students could now avoid using a long period of time in preparation and could go directly to computer programming. Because their computer science work was also going to be seen by others and was going to a useful purpose, these students also became motivated to produce high quality materials. The motivating factor in both programs was tremendous. Students put in countless hours of their own time to work on this project.

At this point, the school division office became interested in the project. The project meets various divisional goals such as interdisciplinary cooperation — in our case, art, computer science and Modern languages — and student created materials which can be used at other levels within the division. The superintendent's department encourages these efforts since younger students often find these locally written materials much more relevant then those produced by large publishers who are forced to be generic in order to cater to a vast market. Secondly, in time of fiscal restraint, locally produced materials can help stretch limited budgets. Thirdly, the River East School Division has programs in French, German, and Ukrainian. All require reading materials and computer software at the elementary level, and this project can potentially provide some of those needed resources.

The River East Collegiate project began by structuring the groups in the second language classroom. Each group of five students was responsible for creating one children's story. Instead of the standard random grouping, students were grouped by their designated interests, and each group had to have one student who was in a computer science or computer awareness class. This was extremely important since later on in the project, these students became the liaison person for the computer science groups who were mostly composed of students not studying a second language. Also, each group needed a student who achieved well in the second language for revision purposes, a student who was in an art class or showed great interest in art for graphical illustration purposes, a student who like composition for creative unit, and finally, a student who did not express any special interest. The students then produced an illustrated children's story to be turned over to the computer science classes.

The computer science classes scanned the graphical illustrations using both a hand and flatbed scanner. After cleaning up the graphics with **SuperPaint**, the images were imported into **HyperCard** where they were used for animation sequences. Some of the animations were simple show card type animations while others used **HyperCard** scripts. Text fields were added to make the electronic stories look like the paper book version. Sound was also added to further enhance the **HyperCard** stacks. The final version was then placed on a floppy disk and inserted into the cover of each story book.

At the end of last year, the teachers involved met to asses the results of this project. Although this project had required many hours of extracurricular time on the part of the teachers involved, the results justified the effort. At River East Collegiate, second language students are becoming more interested in writing in their second language.

The quality of their work is improving as they engage in meaningful writing activities on the computer. Some students who had intended to drop the second language in the coming year are now interested in continuing with their studies. Students are beginning to see how a second language is a valuable resource in the market place.

For the computer science students the project became a chance to turn the abstract into concrete. It also gave them a chance to show their programming skills. Every presentation they made was greeted with praise for their effort. These students became so motivated that some were still trying to improve their **HyperCard** stacks after final exams were written. Students, in general, spent many hours of their own time improving these stories. The fact that other individuals were going to be looking at their work made them want to produce a good final product.

CONCLUSION

The results within the school were extremely positive but the long range possibilities are even greater. Since this material will go to other schools, it may generate an interest in both or either of these disciplines in younger students. It can also provide a source of inexpensive resource material within a school division or district. Other disciplines such as science are now discussing the possibility of joining this project. This year we are intending to create French, German and Ukrainian material with **HyperStudio**. The base of locally produced materials could be expanded to include resource units in core subjects which could be translated into the target second languages. Hardware acquisition could in many cases be justified since some of the software used will be produced locally rather then requiring a large software budget to accompany the purchase. These benefits have encouraged us to continue working on this project.

PRESENTERS' BIODATA

Marcel Matte holds a Masters degree from the University of Manitoba in Education. His experience includes second language teaching at the Elementary, Junior High, and High School Levels. Mr. Matte taught in the French Immersion Program before becoming Modern Language Department Head at River East Collegiate. He was also Sessional Instructor at the Faculty of Education, University of Manitoba. Mr. Matte was the recipient of a Secretary of State Grant from the Government of Canada for work on computer assisted learning in Second Languages.

Edwin Janz has a Bachelor of Education degree from the University of Manitoba. He is an experienced mathematics and computer science teacher, including Advanced Placement Computer Science Prepatory Classes. He is responsible for coordinating the introduction of all new technology at East River Collegiate.

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Electronic Dictionaries and the Acquisition of French Gender Attribution

Clive Matthews

ABSTRACT

It is often remarked that for English-speaking learners, mastery of the gender attribution system of French is one of the most difficult and persistent problems that they encounter. Aside from this practical problem, gender acquisition is also of some theoretical interest. For example, since English is not a gendered language, it is unlikely that there will be any transfer effects, so that we might be observing "pure" second language acquisition; gender is a non-functional aspect of language so that we might be observing pure "linguistic" acquisition; although the system is difficult for second language learners, it appears to be totally unproblematic for first language learner. There is plenty of evidence that closed class systems (such as gender) are distinct from open class systems as far as production is concerned. There is even some evidence that the learning of such abstract morphology might be associated with a single gene.

The work reported here is an attempt to address both the practical problem of improving gender acquisition as well as probing some of the more theoretical questions through students beginning set tasks using an electronic dictionary. An often cited problem in learning gender attribution is that it appears completely arbitrary. This is not so although the underlying system is fairly complex. It is almost impossible for the student to explore the relevant regularities with only a standard paper dictionary. Here electronic dictionaries — in particular, the **Robert Electronique** — offer a powerful new tool by allowing access to and the collation of large amounts of information as a means of discovering and testing hypotheses about the underlying system. In language learning and pedagogical terms, effects of learning on the development of meta-linguistic skills is part of a process of "consciousness raising" and "guided discovery" learning. The project also includes an assessment of the utility of this method through a variety of psycholinguistics experiments.

PRESENTER'S BIODATA

Clive Matthews is a lecturer in theoretical linguistics at the University of East Anglia, England. In recent years, his main interests and publications have been in the relation between second language acquisition (SLA) research and intelligent computer assisted language learning. His current research on gender acquisition is part of a general program of using computers in order to gain greater insight into the nature of SLA.

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HANDS OFF!
A VOICE INTERACTIVE MULTIMEDIA SYSTEM

MAJ CASEY A. NEFF

INTRODUCTION

Since the time when the first explorer crossed the plains, only to discover a whole new civilization with which he was completely unable to communicate, man has been searching for ways to learn foreign languages faster and more thoroughly. Several generations ago, the task was quite straightforward – the king or queen would either send certain subjects to the target country to live for several years and learn the language through immersion or they would receive a tutor who would attempt to school the young heir in the new language. Over time, however, as the number of students and the number of foreign languages being studied increased, foreign language instruction has come to mean crowded classrooms and thick textbooks, with the students far removed from the sights, sounds, and smells of the target language. Mastery of grammar and discrete vocabulary items as a measure of proficiency replaced the more subjective proficiency in the language and the development of necessary communications skills.

Now, however, with the sudden explosion of technology leading the way, language instruction is coming full circle. We have always had the desire to teach our students the culture and civilization along with the language, to give them a simulated foreign language experience of increased realism, but have not always had the tools, time, or funds.

This paper describes an attempt to provide you with one of the tools. It is a speech-controlled voice interactive multimedia (VIAM) system based on the emerging technology of automatic speech recognition (ASR). It will focus on a second-generation voice-controlled interactive multimedia system, the predecessor of which was presented at CALICO '93. The goal remains the same: to develop a working system that will compel the student to use equally all four language skills — speaking, listening, reading, and writing — in order to successfully complete a lesson.

Significant improvements have been made to the initial system in both hardware and software. First of all, the Scott Industries Model 20 speech recognition board has been replaced by the Aria Listener board from Sierra Semiconductor. The most significant improvement of the Aria Listener board is its improved interface with the controlling application (in this case, **IconAuthor** 5.0). This **Windows**-based interface allows true voice control of a voice interactive multimedia lesson – *the keyboard and mouse are both unnecessary and ineffective.* The board also boasts an improved interface for training vocabulary, a more sophisticated speech recognition capability, the ability to play back wave files at a high resolution, and a much lower cost (under $300, vs. $1500 for the Scott board).

VOICE INTERACTIVE MULTIMEDIA SYSTEM

This particular system is based on a 486DX/33 computer with the following specifications:

- 8 MB of RAM
- 200 MB hard drive
- SVGA monitor
- DVA-4000 video overlay card
- Pioneer LD-V4200 laser disc player
- **MS-DOS** 6.2, Microsoft **Windows** 3.1, and **IconAuthor** 5.0
- Proprietary software for Aria Listener and DVA-4000

Any 386- or 486-based computer capable of running **Windows** 3.1 will work, but a 386DX/40 or 486DX/25 or faster provides noticeably better results in terms of execution and response times. Approximately 5 MB of space is taken up by the software for the Aria Listener and **VideoBlaster** software. The laser disc player can be any player supported by **IconAuthor**.

The Aria Listener package from Sierra Semiconductor includes extensive documentation and a moderate-quality microphone which plugs directly into the half-length Aria Listener board.

WHAT IS AUTOMATIC SPEECH RECOGNITION?

Automatic speech recognition is simply using a computer and attached peripherals to recognize human speech and to react in some measurable way to that speech. The algorithms required for ASR are usually implemented on a very fast microprocessor that is dedicated to the task. This microsystem, called a **recognizer**, is typically a third-party board mounted in the host computer. The Aria Listener is such a device. An application program (here, **IconAuthor** 5.0) executing on the host computer uses the recognizer as a speech input device. The recognizer identifies the utterances of the person speaking and presents the application with a number or text string that identifies the recognized word or phrase. The application is responsible for acting on the recognizer's input and for controlling the dialogue with the speaker to achieve the application's objectives. Before a speech recognizer can identify an utterance as being a particular word or phrase, it must be given spoken examples of each of the words that it is to recognize. This process is called **training**. The set of words that have been trained for the recognizer is called the **recognizer's vocabulary**. A speaker-dependent recognizer is sensitive to the vocal characteristics of a specific speaker as well as to the universal phonetic characteristics of human speech. For this reason, a speaker-dependent vocabulary must be trained by the *same* person that intends to use it. When a vocabulary trained by one person is used by another, the differences in vocal characteristics confuse the recognizer and cause it to perform poorly, even though the speech patterns are similar.

In contrast, the Aria Listener Board is speaker-independent. This means that the recognizer may be used without degradation by people who have not participated in the training of its vocabulary. Such a system ignores the many variations in vocal quality, loudness, and rate of speech that distinguish one person's voice from another's, locking instead onto the universal speech patterns that make each word in the vocabulary unique. The distinctive advantage of a speaker-independent system is that the end-user does not have to train it. For foreign language instruction, the need for such a capability is self-evident; the student cannot be expected to train the vocabulary for the recognizer if he is unable to pronounce it.

The most severe limitation on the system is currently the fact that the Aria Listener is what is called an isolated-word processor. In order to recognize a word correctly, it requires that the word be spoken with a small amount of relative silence preceding and following it. It can properly recognize short phrases composed of two or three words when the amount of embedded silence between them is reasonably short because it treats such a phrase as one word. The maximum utterance length it will recognize is approximately four seconds. Constructing a vocabulary of up to 60 words is currently feasible, although a vocabulary of 15 to 40 words is probably sufficient for most applications.

TRAINING THE VOCABULARY ON THE ARIA LISTENER

Before the Aria Listener can be used in a VIAM system, the instructor must first train the vocabulary. This involves identifying which words and phrases will be made available to the student in order to complete the lesson. The words to be used in a particular lesson are grouped into a discrete set of utterances called a **vocabulary set**. Each set can consist of up to 60 utterances, each of which can be up to four seconds long. To create a vocabulary set, the instructor goes through a four-step process:

1. Name the vocabulary set. This can be your name, the name of the lesson, or simply a number.
2. Name each individual utterance in the set. For a foreign language instructor, the most obvious choice is to use the English equivalent of the utterance.
3. Tell the Aria Listener to "learn" the vocabulary. This is done by simply clicking on the Learn button.
4. Assign an appropriate macro function to the utterance, which tells the Aria Listener what to do when it recognizes the utterance.

The Aria Listener will ask you to say every utterance in the set three times. After each repetition, Aria will immediately play back for you your utterance and ask you if it is acceptable. If so, click "Yes"; if not,

click "No." If you wish to increase the number of repetitions beyond three, all you have to do is run through this step again.

To provide Aria with 30 repetitions of each utterance, you would have to repeat this step ten times. Ideally, to reach a training count of 30 repetitions, you would have nine other speakers each perform this step once. In terms of effectiveness, a greater number of speakers providing a smaller number of repetitions would be preferable to the opposite situation. Thus, it would be better to have 10 different speakers each provide three utterances than to have five speakers provide six utterances each. A vocabulary set where ten different speakers each contributed nine utterances is considered the minimum to be usable in a language laboratory setting.

USING THE ARIA LISTENER

The first step in creating a lesson is determining what vocabulary will be required. A vocabulary set can consist of up to 60 utterances, each of which can be up to four seconds long. Although the size of a specific vocabulary set is limited, there is no limit to the number of separate vocabulary sets that can be called up during the course of a lesson.

Once the utterances have been defined, the next step is to train the vocabulary. In another example of the more user-friendly interface, this is done by simply choosing the command "Add A Word." A dialog box appears and prompts you for three pieces of information: the label for this utterance, the macro string it is to execute, and the name of the wave file to play, if any. The label is merely the name given to the utterance and is usually a key word of the utterance itself. The macro string is the most significant part of this feature and is cornerstone of the VIAM system.

In the previous VIAM system, which was based on the Scott Industries SIR Model 20 speech recognition board, the speech board was programmed to recognize an utterance and then send a data string of 24 bits to the controlling application, telling it what the four closest responses were and what their respective numerical scores were on a tolerance scale. This was simply too much information for the controlling application to digest. It became necessary to write an interface program to intercept the large chunk of data from the Scott board and filter from it the few gems of information the controlling application needed. Since this program would not automatically run after every utterance, it was necessary to resort to the keyboard in order to invoke it and make the system work. There were also numerous problems with the allowable wait time between utterances and with the reliability of the interface program.

With the Aria Listener, however, identifying and labeling the variable from the utterance is much easier and more reliable because of the macro functions inherent in the program. There are ten different macro functions which can be called up and used by the board. The one we have chosen to use is one that, upon recognizing an utterance, places a string of characters (such as "myname", which would be set up as "Keyboard (m,y,n,a,m,e,enter")) in the computer's keyboard buffer. The controlling application is then told to search the keyboard buffer at the beginning of each search/respond loop in the lesson. Depending on the character(s) in the buffer, the application would execute a series of commands particular to that string. For example, you have created an utterance in which you spoke the French or Russian equivalent of "What is your address?," named it "address," and gave it a macro function of "Keyboard (a,enter)/." You then speak that utterance into the microphone. The controlling application searches the keyboard buffer for the variable it needs to execute the loop. It finds in the keyboard buffer the character "a" placed there by the Aria Listener after correctly recognizing your utterance. It then assigns the variable the label "a," enters the loop, and begins searching for the command to execute when the variable equals "a." In our case, it will play an appropriate segment of video from the laser disc player and then wait for the next utterance from the student.

A second ingenious feature of the Aria Listener are the macro functions "Listening Off" and "Listening On." During the course of a lesson, a student may find it necessary to pause and ask a question of an instructor. The problem is what to do with the microphone, which is quite sensitive. An attempt to move or cover it with the hand may create unintentional noise which the application will interpret as an utterance. To eliminate this problem, you create an utterance called "Listening Off." When the student speaks this phrase (such as "stop"), the Aria Listener shuts off the microphone and ignores all further utterances until it is told to start again. The student accomplishes this by speaking the utterance which has Listening On as the macro command string (such as "start"). To further reinforce the foreign language experience, the instructor who sets up the vocabulary can put these utterances into the target language.

WHAT NEXT?

The future of automatic speech recognition is before us; its surface has only been scratched. In addition to using ASR technology to drive a video disk player and create VIAM lessons, as opposed to current interactive video lessons, ASR can be used – right now – to create audio flash cards, where a student would have to pronounce correctly a vocabulary item, rather than simply say it to themselves mentally or type it into the keyboard. A voice-driven grammar exercise program could also be created, where a student would have to fill in verbally the blank(s) in a sentence, rather than type them in at the keyboard.

Another possibility is to create a translation-type exercise, where the student must act as an interpreter for the computer. An image would flash on the screen, requesting the student to ask a fictional character (also played by the computer) various simple biographical- and survival-type questions. If asked correctly, the program would proceed to the next task; if not performed to standard, the student could be prompted aurally or visually on how to correctly perform the exercise. Depending on the level of sophistication desired, it is possible to include prerecorded audio files which give the students guidance in these exercises, and would be played back at specified locations. It would even be possible, if the instructor could anticipate some of the most common mistakes in pronunciation that the students would make, to train incorrect utterances in a vocabulary set. Then, if the student mispronounces a word or phrase, and the instructor correctly anticipated it, the program would display a screen in which the student would be told what he or she did wrong and how to correct it, followed by a prerecorded wavefile giving the correct pronunciation and giving the student the opportunity to repeat it two or three times before returning to the original exercise.

On the distant horizon would be the marriage of ASR with virtual reality. This would dispense with the need for a VIAM system where the student looks at a screen and responds to preprogrammed situations from a laser disk. Instead, this system would create for the student an all-encompassing simulated environment of virtual reality which would surround and inundate all of the student's senses, just as standing on a street corner in Paris or Petersburg would. The student would be able to ask an approaching militiaman for directions to the Louvre or the Winter Palace and then, while following those directions, to see the road signs, kiosks, and people, and experience the sounds and smells just as if he were really there.

While virtual reality is still more virtual than real, all of the other previously-mentioned concepts and programs can be made today with technology that currently is on the market. It works, it is based on accepted and proven pedagogical principles, and the students love it. In fact, they will beg to go to the lab *more*. In addition, with the recent free-fall in prices of both personal computers and other hardware and software components, putting together these systems is now within the reach of all institutions. All it takes is a little commitment and imagination, both of which educators possess in abundance.

PRESENTER'S BIODATA

Casey A. Neff, Major, U. S. Army, holds a Master's Degree from Cornell University in Russian Literature. A self-taught computer specialist in both DOS and Macintosh systems, he concentrates on automatic speech recognition, interactive video and multimedia. This is the second year he is making a presentation on automatic speech recognition to CALICO. At the time of this presentation, he was assigned as an Assistant Professor of Russian in the Department of Foreign Languages at the United States Military Academy at West Point, New York.

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INTEGRATING TECHNOLOGY INTO LANGUAGE CURRICULA: AFTER THE WORKSHOP'S OVER

WALTER OLIVER, BARBARA LAFFORD, PETER LAFFORD, AND DAN BRINK

ABSTRACT

A frequent concern of educators is the implementation of training and integration of technology into language curricula after their workshop is over. Stimulation of faculty involvement is one of the most critical human factors in successful application of technology in a given educational setting.

The Language Acquisition Resource Center (LARC) at San Diego State University houses one of the nation's four Language Resource Centers administered by the Center for International Education, U.S. Department of Education. LARC has worked to promote the integration of pedagogically-driven technology into all aspects of language curricula. LARC projects have included the building of a multimedia library and development of authoring templates, both of which are used to train educators in software evaluation and instructional use, as well as courseware authoring. Training in alternative authoring programs (e.g., **Toolbook for Windows** and **Libra**) has been offered through LARC's intensive Summer Institutes.

The one-week Summer Institutes provide a pedagogical overview, hands-on experience in authoring, and a facilitating support system. Participants create interactive video lessons, develop a plan for implementation at their home institutions, and later, participate in follow-up evaluations. Participants remain linked to LARC through the e-mail LARC-Net and retain access to LARC technical staff and the visiting experts who conduct the workshops.

Two educators from Arizona State University participated in LARC's Summer Institute 93. The courseware which they developed on **Toolbook for Windows** and the training which they received have been applied in a new Language Computing Laboratory, giving interested students and supportive faculty an opportunity to work with foreign language software in a new CALL environment.

In a "Computers and Applied Linguistics" special topics seminar, the original workshop participants teamed graduate students with each other and with interested faculty. The seminar was designed to familiarize participants with **Toolbook for Windows** quickly by requiring creation of a simple project due at mid-semester. Using feedback from that experience, seminar participants were to design and develop new and different projects by semester's end. The seminar yielded a variety of impressive and creative software (featured in the presentation) and students who wish to continue have been encouraged to proceed with the projects into the next semester, meeting weekly on an informal basis for support and direction. In addition, interested foreign language faculty have been given an opportunity to learn how to develop multimedia programs for their own classes.

PRESENTERS' BIODATA

Dr. Walter Oliver, Professor of Spanish, California State University, San Bernardino, represented LARC as an alumni in both the **Toolbook** Summer Institute and the **Libra** Summer Institute (San Diego 1993).

Barbara Lafford, Associate Professor of Spanish and Linguistics, Arizona State University (ASU), attended the LARC **Toolbook** workshop in 1993, and is working on software for the newly-renovated language lab.

Peter Lafford, Manager of the Humanities Computing Facility at ASU, attended the LARC **Toolbook** workshop in 1993, and is coordinating the renovation of the computer side of the language lab.

Dan Brink is a Professor of English at ASU, with a long-standing interest in the use of computer technology in humanities applications.

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Interfacing with Foreign Cultures: New Multimedia Interactions

Sue E. K. Otto and James P. Pusack

ABSTRACT

An ongoing University of Iowa project to develop culturally-oriented, content-based instruction for intermediate language study in French and German has led to the development of a number of new multimedia interactions. These interactions elicit student responses that are not evaluated as right or wrong; they encourage students to struggle toward their own insights about the target culture, rather than having them served up like fortune cookies. In particular, we are concerned that students not gain the impression that cultural knowledge and cross-cultural differences are absolutes.

Much of the interactive software we have developed recently focuses attention on listening skills and expects that students will generate correct answers. However, such activities do not tend to engage the students' critical thinking capacities or work to build their ability to observe and evaluate cultural differences. For this reason, we decided to create a small number of new multimedia interactions that stress opinion-forming, rather than responding to right/wrong alternatives. Students will be able to identify with a particular (and possibly changing) point of view before, during, and after work with a given cultural document. The students' opinions will flow into a growing database of such viewpoints gathered from other students, from members of the target culture, and from available research. This information will also be made available to the learner at the appropriate moment. Listening tools and tasks necessary to arrive at an informed opinion will be provided along the way, but the goal will be to assemble knowledge as a prerequisite to larger cultural understanding.

PRESENTERS' BIODATA

Dr. Sue E. K. Otto is Director of the Language Media Center, Adjunct Associate Professor of Spanish at the University of Iowa, and Co-Director of the LLAMA Consortium and of the Project for International Communication Studies (PICS). Past President and past Executive Director of the International Association for Learning Laboratories, Professor Otto is a noted authority on the use of new technologies in the language laboratory and CALL.

Dr. James P. Pusack is Associate Professor of German at the University of Iowa, Director of the Center for International and Comparative Studies, Co-Director of PICS and of the LLAMA Consortium. He is a nationally-known expert on foreign language instructional technology and CALL. He has been the Language Series Editor for *CONDUIT* for a number of years and has co-authored the book *Using Computers in Teaching Foreign Languages*.

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Pedagogical Models and Applications for FL Composition Using CMC

Dana Paramskas

ABSTRACT

Computer-Mediated Communication (CMC) is a relatively new field; even so, it already includes a large number of applications. Electronic mail, in particular, provides a practice area for language learning as well as cultural exchanges. Numerous projects undertaken worldwide have put second-language learners in contact with native speakers and enabled them to discuss differences in culture; some projects were subject-centered (political science, history, geography, etc.).

The logistical difficulties in setting up these projects, in terms of recruitment, hardware, and pedagogical design, are such that relatively few offer pedagogical models applicable to more than one situation. It is the purpose of this paper to propose an alternative model of more general use, based on two years of experience in six courses using an internal conferencing system rather than inter-institutional e-mail.

A conferencing system includes both e-mail facilities and a bulletin-board type of display. At the University of Guelph, we use TCoSy, a conferencing system originally developed at the university but now available commercially. At the present time, over 32 courses in varied disciplines use the system as an integral part of regular coursework; student registration in those courses (including some doubling) is over 3,000 (out of a student population of 10,000).

I have used TCoSy for two years in conjunction with 8 courses in French language and literature. This paper will present the pedagogical models used, discuss the difficulties and the advantages of such CMC use, and give numerous illustrations of how CMC can motivate and improve student writing in French.

PRESENTER'S BIODATA

Dana Paramskas (French Studies, University of Guelph, Ontario) has taught French for over 20 years and has been involved in some form of pedagogical technology research for many of those years. She is co-author of CALL courseware such as **CLEF**, **PROMPT**, **DICTATE**; co-author of the interactive videodisc *VI-CONTE*; and author of numerous articles and book chapters dealing with CALL.

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The Moscow Kremlin: An Interactive Tour

Mark Powell

INTRODUCTION

This program is designed to teach students of Russian about several historic buildings contained in the Moscow Kremlin and nearby Red Square through the use of a **HyperCard** stack and accompanying videodisc. The program teaches students about the construction, architecture, and function of these buildings, as well as others that border Red Square. This is accomplished by using clips from a videodisc with narration in either English or Russian. The construction architectural information, as well as historical data is contained in the accompanying **HyperCard** stack, the text of which is available in either English or Russian.

Even though the use of interactive videodisc (IAV) technology in the foreign language classroom is fairly new, this recent movement has both its supporters and critics. Despite the criticism, foreign language educators have continued to use interactive videodisc to teach students language skills, to help students improve their communicative competence, and also to teach students about the target culture.

Over the years, educators have used audio tape and simple videotape to teach these same language and culture elements. These two types of media are useful to some extent, depending on what type of skills you are trying to teach. However, videodisc technology has combined these two different media types into one single videodisc. In addition, computer programs developed using sophisticated authoring systems now allow students to have random access to the information contained on the videodisc. Educators and software developers can also incorporate graphics, text, and additional information into this computer program to help give the student well-rounded foreign language instruction.

FOREIGN LANGUAGE INTERACTIVE VIDEODISCS

Over the course of the past 15 years, a number of interactive videodisc programs have been developed to teach foreign language. Some of the more notable programs are: BYU's *Montevidisco*, MIT's Athena Language-Learning Project (ALLP), and the Annapolis Interactive Video Project. Many of the programs continue to be used in foreign language instruction, while others are still being modified and tested. These pioneering programs have encouraged and inspired other foreign language educators to develop their own programs, using IAV technology.

The author of this article has been influenced by programs such as *Montevidisco* and *Spanish Language and Culture*, both of which were developed at the Humanities Research Center of Brigham Young University. As a result of the incredible resources available at the BYU's Humanities Research Center, the author began learning about the use of IAV instruction in the foreign language classroom. This program, the **Moscow Kremlin: An Interactive Tour**, is a direct result of learning and work done at the Humanities Research Center. During the initial stages of study, the author noticed there were a number of IAV programs developed for languages such as Spanish, German, French, Italian, Japanese, and Portuguese. However, the author noticed that his language of speciality, Russian, was poorly represented in this list.

RUSSIAN LANGUAGE VIDEODISCS

In order to solidify the position of Russian in this list, the author decided to develop an IAV program to teach aspects of Russian culture. The first step in this process was to locate a videodisc to use as a basis for the computer program. The author faced the following two different options in this search: production of the authors own videodiscs or repurposing of an available videodisc. The developing, recording, and pressing of a new videodisc was considered.

However, time and financial constraints made this option impossible. The second option, then, had to be considered as the only viable option. After a short and limited search, only two sets of videodisc material were initially found. The first being the disc used for this program. The other videodisc material was a five-disc collection produced by the BBC. This collection contained a wide variety of material for beginning students of Russian, as well as segments from the Russian serial entitled "Dosvidanya Leto." The author determined this collection contained more than enough material as a basis for a program. However, the organization of the material would necessitate a number of changes in videodiscs throughout the course of the program. This collection of videodiscs was ruled out based on this problem.

With the advent of CD-ROM technology, it may be possible to digitize several portions of these five discs as a basis for a future IAV program. Further research and investigation revealed two other sets of videodisc material in Russian. The first set of discs was part of the Annapolis Interactive Video Project at the United States Naval Academy. This is a three-set disc collection that could be used for a wide range of students. However, due to copyright restrictions, this collection is only available to U. S. government agencies. The second set of materials was produced in a joint project between the State University of New York (SUNY) system and the United States Air Force Academy. This is also a three-disc collection featuring news and documentaries from Russian television. However, as far as the author knows, this collection is still unavailable for commercial use (Rubin 1990, 52).

An additional Russian IAV program entitled **Khorosho** is in the final stages of development at the Federal Language Training Laboratory. This program is tentatively scheduled to be presented at the CALICO '94 "Human Factors" Symposium. This program was modeled after the *Exito* course, developed by the CIA Language School. It is designed to teach adult students the skills of reading, understanding, and speaking in a manner sufficient enough to survive in Russia (Hughes 1993, 393).

PROGRAM DESCRIPTION

The Moscow Kremlin: An Interactive Tour is a program that uses a **HyperCard** stack and a videodisc entitled *The Kremlin: A VIP Tour of Historic Moscow*, which was produced by ABC News and distributed by the Voyager Company. The material for the videodisc was taken from a special one-hour ABC News broadcast, which was narrated by Sam Donaldson and Diane Sawyer. The videodisc is 30 minutes long and is a CAV formatted videodisc containing a total of 54,000 frames, along with two narration tracks: one in English and one in Russian. A third track contains Russian classical music, which is played throughout the disc. The disc itself is composed of full motion video as well as a number of still images, located at the end of the disc.

VIDEO SEGMENTS

The program contains a total of 20 full motion segments with video of several sites, ranging from the Kremlin Cathedrals to the Kremlin Palaces to St. Basil's Cathedral on Red Square to the Kremlin Armory Museum. These segments vary in length from fifteen seconds to over two minutes. Each of the segments is accompanied by narration in either English or Russian. In addition, there is one section with still images of some of the Kremlin towers.

HYPERCARD STACK INFORMATION

Included with each video segment in the accompanying **HyperCard** stack, is a series of three different card types: an instruction card, a history card, and a video card. The instruction card consists of a digitized picture of the building or site, taken from the videodisc. It also contains general information about the building which includes the construction dates, the architect, and names of royalty who commissioned the building. Additional information about the purpose of each building or room is also contained in this card. The text contained in this card is available in either English or Russian. The user has the option of changing between the two languages throughout the program.

The history card is composed of a timeline containing important dates relating to the history of the building. This information might include dates of construction, dates of restoration, as well as dates referring to events associated with a certain building. Again, the user has the option of viewing this historical information in either English or Russian. To change languages, the user must simply click on the appropriate button.

The third and final card type is the video card. The video card contains information about the length of each individual video segment. The card also contains the text of the audio narration. This text is also available in either English or Russian. The user also has several playback options. S/he may view both the audio and video simultaneously. The user also has the option of listening only to the audio track of the segment. In addition, the user can also view only the video portion of the segment, without the accompanying narration.

All of the options are available to the user at the touch of a button. The author has designed the playback so that the user must completely finish the viewing of the video or listening to the audio track before continuing. The user does not have the option of stopping the video or audio segment. The video card featuring the Kremlin towers contains only still images of a number of towers.

EVALUATION COMPONENT

The program also contains a short quiz or test component at the conclusion of the program. The quiz is designed to reinforce the information contained in the program. The quiz itself is composed of various types of multiple choice questions taken from the segments viewed by the user. The user may be asked to select the correct name of a digitized picture of a building or room from a number of choices. They may also be asked to select the year in which a building was built. They also may be asked to select the correct architect of a building. All of the information for the test items will be taken directly from the audio narration as well as information contained in the accompanying **HyperCard** stack. The questions as well as the answers in this quiz will be in Russian only. The author chose multiple choice test items because of the difficulties associated with differing Cyrillic keyboard layouts. These particular test items were also chosen because of their compatibility with the scripting used in the **HyperCard** stack.

PRACTICAL APPLICATION OF PROGRAM

The program was originally designed for use in a culture class taught at Brigham Young University. The class is taught in English and focuses on several different aspects of Russian culture, from the early beginnings in the Kievan Rus' through the Muscovy Period and finally incorporating current changes in Russian culture. The English/Russian option was included to give students the flexibility of choosing either language. More advanced students may want to listen to and view everything in Russian, while lower level students may want to only listen to or view certain portions in Russian, with the remainder in English. The language option is up to the students. The instructor of the course would have control over assignments, relating to the program. Perhaps the instructor would require the students to view a certain number of segments, either randomly or according to the course syllabus.

In order to give instructors the option of adapting the program to their individual class, a wide variety of segments and information was included in the program. The instructor could supplement the information contained with additional readings or perhaps a slide show. This, of course, is entirely up to the discretion of the instructor. The program could also be adapted for a culture course taught entirely in Russian. Instead of having the option of switching languages, the students would only be given the option of viewing the segments or reading the texts in Russian. The instructor could also assign additional readings in Russian.

CONCLUSION

The author does not intend this program to be of the same calibre as some of the programs mentioned previously. This program was a simple attempt to repurpose a videodisc to use in the teaching of Russian culture. The programming and scripting used was also not as advanced as some of the more sophisticated programs. This programs was intended to be a model for others to use in repurposing other videodisc materials. A further resource to help in repurposing videodiscs is an article entitled "Implementation of Generative Learning Principles in Interactive Video Using Repurpose Video Materials" by Marjorie A. Cambre, Martha B. Grant, Kenneth B. Hay, and Gary B. Mayton. This article is in the *Journal of Visual Literacy*, Volume 12, Number 1.

It is the hope of the author that more research and development maybe done with IAV in foreign language classrooms. Perhaps IAV technology can be merged with the ever expanding CD-ROM technology to produce a complete package that does not require a separate videodisc player and monitor. This would definitely further the current advancements in CD-ROM technology.

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PRESENTER'S BIODATA

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Record Keeping in WinCALIS 2.0

Nagendra Revanur

ABSTRACT

Almost all teachers involved in computer based language instruction would like to have an authoring system that automatically captures student-computer interaction to disk and provides tools for qualitative analysis of the stored data.

WinCALIS 2.0 record keeping subsystem, an integral part of the multilingual **WinCALIS** 2.0 authoring system, does just that. The data that it records includes the answers entered by the student, the time spent answering each question, the number of attempts made, and the score the student obtained. The various permanent and temporary database tables it creates and maintains can be used, with the help of some built-in queries, to gauge proficiency and determine placement.

The presentation will start with an introduction to the **WinCALIS** 2.0 system. Later, a detailed description of the record structure and of the tools that can be used for analysis will be given. A comprehensive demonstration of the working of the record keeping subsystem will conclude the presentation.

PRESENTER'S BIODATA

Nagendra Revanur is an Associate in Research at the Humanities Computing Facility at Duke University. He is interested in graphical user interfaces and computer graphics, and specializes in Windows programming.

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THE EFFICIENT USE OF THE COMPUTER IN L2 PRONUNCIATION INSTRUCTION

BERNARD L. ROCHET

ABSTRACT

Auditory practice is an essential component of L2 pronunciation learning, and is very well suited to computer assisted instruction. To be useful, however, software for L2 auditory practice must not be content simply with making available for random access the sounds of the target language. Such software must present those sounds in a structured way, focusing on the L2 learner's problem areas and making use of the concepts of contrastive presentation and maximally differentiated stimuli. Visual support for the target sounds may be desirable as long as it is meaningful, and relates in a straightforward way to the sounds it accompanies. Feedback must be immediate and go beyond a mere statement of answer appropriateness to provide a structured auditory comparison of the sounds under study.

INTRODUCTION

Because of inherent limitations in speech recognition technology, production training with on-line assessment of students' pronunciations cannot at present be readily implemented on microcomputers. Thus, the role of the computer in teaching second-language pronunciation must be restricted to helping students develop their auditory skills. The computer is nonetheless valuable in this capacity, however, because the ability to perceive correctly the sounds of a target language is a necessary condition (albeit not a sufficient one) for a near-native pronunciation of those sounds (Rochet 1990). In fact, there is evidence that improvement in auditory skills is generally accompanied by improvement in production performance (Mueller and Niedzielski 1968; Winitz 1969; Rochet 1992). This suggests that L2 pronunciation instruction should include an auditory training component. In an approach which acknowledges or even emphasizes the role of auditory training, computer technology has much to offer.

The value of programmed auditory instruction has long been recognized by pronunciation specialists (Winitz 1969) and whatever their stated aims, existing CALL pronunciation software packages rely on the computer's ability to deliver unerringly and indefatigably the sounds of the target language. The fact that digitized sound provides students with immediate and random access to examples of L2 pronunciation is viewed as a great asset, and this feature is often mentioned as one that makes microcomputers superior to traditional analog technology for L2 pronunciation instruction. It must be kept in mind, however, that merely making unstructured sets of auditory materials available to students does not by itself constitute adequate auditory training, even when access to those materials is immediate and random. The purpose of this paper is to argue that existing L2 pronunciation software can be improved by presenting the sounds of the target language in a way that a) reflects the degree of difficulty of those sounds, and is based on established principles of L2 speech perceptual learning, and b) follows accepted principles of programmed instruction, and particularly efficient reinforcement via systematic and meaningful feedback.

THE NEED FOR A STRUCTURED PRESENTATION OF L2 PRONUNCIATION MATERIALS

While random and immediate access to the sounds of the target language is a feature which can profitably be exploited by students, it cannot be the only goal of well-developed instructional packages. It has been observed that L2 learners often experience difficulties in perceiving L2 speech distinctions even after considerable exposure to the sounds of the target language (Jamieson and Morosan 1986). This is hardly surprising in view of the fact that L2 learners perceive the sounds of the target language in terms of the phonological categories of their native

language (Flege 1988; Rochet 1991). It is therefore doubtful that software packages that merely make L2 sounds available to students, without helping them perceive the relevant and distinctive characteristics of those sounds, can be of much value. On the other hand, there is evidence that perceptual training with well-structured sets of selected L2 sounds results in improved perceptual performance in a relatively short amount of time (Jamieson and Morosan 1986; Pisoni, et al. 1982; Rochet and Chen 1992).

The purpose of auditory training is to help L2 students learn to perceive sounds of the target language that are foreign to them in a way that replicates as much as possible the perception of those sounds by native speakers of the target language. A clear case of a problem area is that in which the target language has two contrasting sounds where the L2 learner's L1 has a single phoneme. An example of such a situation is French with its contrasting vowels [y] and [u] versus English with its single [u]. Such cases deserve special attention and are not adequately addressed by programs that merely make available all the sounds of the target language and invite learners to play a list of words containing those sounds (or each word individually). Nor is it sufficient to point out that a given L2 sound does not exist in the learner's L1. Such a statement may lead students to listen to the "new" sound in question, but beginners are likely to hear it as one of their L1 sounds.

For example, anglophones listening to French [y] are likely to perceive it as their L1 [u] because they have only one high, rounded vowel category where French speakers have two (Rochet 1991). Furthermore, mentioning that a given sound in the target language does not exist in the learner's L1 fails to identify the single L1 sound category that must be split into two by the learners. For example, simply to say that French [y] is a sound that does not exist in English does not reveal that anglophones must learn to distinguish between [y] and [u] but will have little difficulty distinguishing [y] and [i].

On the other hand, speakers of Brazilian Portuguese must learn to distinguish French [y] from their [i] vowel, and usually have no trouble distinguishing it from [u].

Finally, a so-called new L2 sound is not always clearly distinct from existing L1 sounds: French [y] is in fact very close to English [u], and the latter is often perceived as [y] by French listeners; conversely, French [u] is often as difficult to master as French [y] for anglophones. What is new, and therefore constitutes a difficulty, is the fact that the sounds [y] and [u], which anglophones perceive as belonging to the same category, must now be perceived as two separate phonemes. It is therefore essential to present students with the two contrasting sounds until they can hear the difference between them. If such auditory training is not provided early in L2 learning, students with several years of coursework in a second language may still fail to hear the difference between some L2 sounds. Those of us who teach French are used to anglophone students who do not hear any difference between the French words *rue* [ry] ("street") and *roue* [ru] ("wheel").

In order to facilitate the learning of the new contrast, one must initially make use of maximally distinctive stimuli (Jamieson and Morosan 1986; Spiker 1959; Winitz 1969). This approach is necessary not only to make it easier at first for untrained students to hear the contrasting sounds as somewhat different, but also because a small difference may result in the students' orienting toward irrelevant features of the stimuli, whereas a large difference is likely to result in a relatively rapid orientation toward the relevant dimension (Spiker 1959). Helping students focus on the relevant dimension is also facilitated by contrasting pairs in which the only difference is that between the two contrasting target sounds, hence the use of minimal pairs. Optimally different members of a contrasting pair can be obtained by means of speech synthesis, which makes it easy to ensure that only the relevant difference between the two sounds is present, and that the two sounds are maximally differentiated along the relevant dimension. For example, the French vowels [y] and [u] can be synthesized as five-formant vowels that differ only in the value of their second formants, with a low value (700 Hz) for [u] and a high value (1800 Hz) for [y].[1]

The two concepts of contrasting sound units and maximally differentiated stimuli as representatives of those units are also very useful in the case of sound categories that are found both in L1 and L2, but are articulated differently in the two languages. For example, French coronals differ from their English counterparts in that the articulation of the former is apico-dental while that of the latter is apico-alveolar. The acoustic difference is salient enough to signal an accented (i.e., foreign) pronunciation, but it is not perceived by L2 learners unless their attention is called to it. This difference can be taught very effectively by contrasting French-sounding examples

with English-sounding tokens. Stimuli that are maximally differentiated along the relevant dimension can be obtained not only via speech synthesis (see above), but also by editing natural stimuli. One can start from a French word containing a coronal pronounced as an apico-alveolar (by an anglophone). Because a salient acoustic characteristic of apico-alveolars (as opposed to apico-dentals) is a prolonged period of frication following the consonantal release burst, one can create exaggerated alveolar-sounding tokens by lengthening the frication period (through mere copying and pasting with a sound editing program), and dental-sounding tokens by cutting the frication period following the burst. The result is pairs of words that can be described as "correct/incorrect" or "French accent/English accent." Once students can hear the difference between the faulty pronunciation and the correct one, they can imitate both and acquire the correct pronunciation.[2]

THE ROLE OF VISUAL SUPPORT IN AUDITORY TRAINING

In the examples mentioned above, it has been assumed that the speech sounds presented to learners were accompanied by known visual displays corresponding to each item of the contrasting pair. When the sounds in question are different phonemes to be learned, it is simplest and most efficient to represent them with the corresponding orthographic or phonetic symbol, or both (e.g., French [y] <u>, or [u] <ou>). One can also make use of pictures representing objects whose names contain the sounds in question, but such pictures are only useful for the specific objects they represent; different examples require different pictures, and this mode of representation is only possible for concrete terms. Except for very young children who do not know how to read, a spelling representation is more efficient since the same representation can be used for numerous tokens; furthermore it is useful to reinforce the link between a given symbol (phonetic or orthographic) and its corresponding acoustic value.

Apart from these two modes of visual display, it is sometimes suggested that one should take advantage of the multimedia environment of the computer and juxtapose with a given sound a display of its corresponding waveform. Although a multimedia approach is likely to prove efficient because it draws on more than one sensory faculty, there is no evidence that waveform displays helps students learn the corresponding sounds. Whatever the chosen visual display, it must be meaningful and therefore must consist of something the student knows and can use as an anchor in learning a given sound or pair of sounds. For this reason, it is unlikely that waveform displays or spectrographic representations can be of any help for teaching most speech sound characteristics. The location of F2 on a spectrogram is a good indication of whether a given word contains the vowel [y] or [u], but this is not something that most L2 learners are familiar with. It is possible of course to teach them how to read spectrograms, but it is much more straightforward and more meaningful in the L2 learning context to teach them spelling-to-sound correspondences and to use orthographic or phonetic symbols as visual support for the sounds to be mastered. In cases where visual representations of acoustic signals are meaningful to students, because they represent in a simple way features that students are familiar with, such representations can be helpful.

Displaying the F0 contour of an utterance for teaching tones or intonation is such a case because the contour line goes up as the pitch goes up. Even in this case, however, it is essential that the link between visual display and sound be simple and devoid of any ambiguities. Spaai and Hermes (1993) argue that stylized pitch contours are better suited to the teaching of intonation than unprocessed pitch contours, because the former are easier to interpret. Waveform displays can also be useful when dealing with differences in amplitude or duration. For example, one can illustrate the difference between word-initial French and English voiceless plosives by displaying their waveforms and comparing their respective Voice Onset Time durations. This approach is only useful, however, if students can readily identify the consonant burst and the portion of the signal that corresponds to Voice Onset Time; for this reason it is probably best to restrict such displays to monosyllabic words.

FEEDBACK FOR AUDITORY TRAINING

One essential aspect of computer-assisted auditory training is the type of feedback provided to the students. First, it is essential for feedback to be immediate. Mueller and Niedzielski (1968) had recognized the importance of immediate feedback. They marked each response box on the students' answer sheets with invisible ink, and gave students a special pen. When the box corresponding to the correct answer was checked, a grey dot appeared in the box; when the wrong box was checked, a faint yellow

mark appeared instead. Similarly, in an experiment with children, Winitz and Preisler (1965) provided positive feedback by means of a toy car going up a ramp for each right answer.

At first glance, such feedback appears perfectly adequate: students know instantly whether their answer was right or wrong. This type of feedback is in fact what most computer programs use: the technology is different, and some variety may be introduced in the computer's responses, but as with Mueller and Niedzielski's invisible ink and Winitz and Preisler's toy car, students are simply told whether their answer was correct or incorrect. This may be sufficient when only two answers are possible, but it is inadequate when a larger number of choices exist; in such a case, it is necessary to indicate what the correct answer is and how it differs from the student's answer.

In fact, even when there are only two choices, feedback should consist of more than a statement that the answer was correct or incorrect. An incorrect answer in the case of a vowel contrast means that the student is not able to distinguish with any certainty between the two members of the contrasting pair. To help the student make any progress toward mastery of the contrast, it is necessary to keep playing the two sounds one after the other. For example, after a wrong answer, the program should make it possible for students to replay the sound that was to be identified and the sound that was incorrectly identified. In this way, students can immediately play both sounds and should be encouraged to proceed to the next question only after ensuring that they can hear the difference between the two sounds and that they can identify them correctly. Only by providing students with the sounds making up the contrasting pair can an instructional program be said to provide truly meaningful feedback, instead of merely indicating a score.

CONCLUSION

For computer-assisted L2 pronunciation instruction to be efficient and useful, the materials must be presented in a structured fashion. The sounds that constitute problems for L2 students — either because they enter in contrasts unknown in the students' L1, or because their articulatory/acoustic characteristics are different in L1 and L2 — must be presented in contrasting pairs, and the members of each pair must be maximally differentiated stimuli. In addition, feedback must be systematic and meaningful, and provide students with the ability to compare the sounds in question at every opportunity. These features, which are necessary to ensure efficient and rapid learning of the sounds of the target language, can be easily implemented through simple programming and will help computer-assisted auditory instruction contribute in a significant way to the teaching of L2 pronunciation.

NOTES

[1] Similarly, the difference between voiced and voiceless occlusives can be synthesized as a difference in Voice Onset Time, i.e., the duration of aspiration between the release of the consonant and the beginning of the following vowel (see Rochet and Chen 1992).

[2] This contrastive approach has been used to teach correct pronunciation to children with faulty articulations in their L1. Findings by Winitz and Preisler (1965) suggest that for some children sound discrimination training results in improved sound discrimination and that it facilitates sound production learning.

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PRESENTER'S BIODATA

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Information Technologies for Foreign Language Teaching: A Model Distance Education Course

A. Allen Rowe

THE PROBLEM

In 1990 Utah launched the Educational Technology Initiative (ETI) to promote the effective use of technology in the public schools. It has been characterized as:

> A four year venture (1990-1994) funded by a partnership involving state government, public schools, colleges of education and private businesses... Total funds projected for the four year project are estimated at $220 million (Bluhm, Drew, and Blankenship 1992, 85).

One of the primary purposes of the ETI has been to provide instructional technology equipment to public schools and universities throughout the state through a mix of public and private funding. The availability of these funds has increased the opportunities for Utah foreign language teachers to use instructional technology.

As opportunities for using technology in language teaching have increased, so have the quantity and diversity of technology assisted language learning (TALL) options reaching the educational marketplace. This growth, along with decreasing prices, has greatly multiplied the potential for both successful and unsuccessful applications of TALL.

To date, Utah foreign language teachers have had limited opportunities to learn to make appropriate use of language learning technologies, and frequently excitement about new technology has not characterized the typical foreign language teacher. However, teachers are now showing an increased desire for learning more about instructional technology. Recently, seventy-five Utah teachers participated in a State Department of Education distance education seminar on the use of videodisc to teach Japanese. Also, Utah teachers lead all states but Nevada in the number of presentations on technology accepted for the 1994 meeting of the Southwest Conference on Language Teaching SWCOLT: AZ, CA, CO, NM, NV, OK, TX, UT (personal communication with Joan Patterson, Utah State Department of Education Specialist for Foreign Languages, March 1994).

Thus, a problem exists: How to meet the growing need to better prepare Utah foreign language teachers to use the new technologies the ETI seeks to promote.

A PROPOSED SOLUTION

A Distance Education Course

To reply to this need Dr. Nick Eastmond (Professor of Instructional Technology/Languages and Philosophy, Utah State University [USU]) has proposed a new graduate level distance education course for fall 1994: "Information Technologies for Foreign Language Teachers" (InsT/Ling 640). As the InsT/Ling 640 course designation indicates, Dr. Eastmond has obtained approval for the course to be offered jointly by the Departments of Languages and Philosophy and Instructional Technology.

As Dr. Eastmond envisions it, InsT/Ling 640 will offer foreign language teachers an opportunity for professional development as well as training. This is in keeping with current practice in foreign language teacher education (Lange 1990, 250).

Thus, although InsT/Ling 640 will present various machine technologies, it will not focus only on these. Nor will it emphasize only what Jacques Ellul calls the technique of technology, that "complex of standardized means for attaining a predetermined result" (Merton 1964).

Rather InsT/Ling 640 will encourage teachers to reflect upon technology's potential effect on models of instruction and learning environments. For example some applications of technology provide learning and study opportunities never before possible. Two such applications are Carolyn Fidelman's

In The French Body (1992) and **In the German Body** (1992). These two interactive video programs greatly facilitate the study of nonverbal communication, thus making feasible new approaches to introductory, intermediate, and advanced language study. For this reason, InsT/Ling 640 will present **In the French Body** and **In the German Body** as focal points for discussion and comparison with other applications.

The course will use the discussion and comparison of various technology applications to promote a key idea: The effective use of technology fundamentally changes the nature of the language learning experience. To convey this idea, the course will promote a dialectic experience, favoring the development of individual synthesis of ideas through the presentation of various theses and antitheses relating to technology and foreign language teaching. For example, the course will encourage teachers to formulate their own, possibly dissenting, ideas about various applications of technology and then to present and discuss these ideas in the forum of two-way video. Hopefully, these discussions will lead teachers to think in terms of a paradigm shift (Kuhn 1962) that would lead to more effective uses of technology in foreign language learning.

A literature review completed in early summer 1993 and reported more fully later in this proposal found no references to existing distance education courses for in-service foreign language teachers. The review did, however, turn up numerous articles and books on foreign language teacher education and on various types of technology assisted language learning (TALL), including distance education for language study and the use of various technologies such as computers and video in foreign language classrooms and labs.

A sampling of the works on foreign language teacher education indicated that such preparation often totally overlooks instruction in appropriate uses of technology. Thus, existing literature is not particularly rich in examples of how to set up any type of instruction on technology for foreign language teachers, either in-service or pre-service.

Telephone contact with the offices of the American Council on the Teaching of Foreign Languages (ACTFL), the Northeast Conference on the Teaching of Foreign Languages (NEC), the National Foreign Language Resource Center (NFLRC) at San Diego State University, and the Teachers of English to Speakers of Other Languages (TESOL) revealed consensus on the need for such a course. Dr. Ed Scebold, ACTFL's Executive Director, (personal communication, May 17, 1993) expressed interest and enthusiasm for such a course. Dr. Gail Robinson-Stuart, Director of the National Foreign Language Resource Center at San Diego State University, (personal communication, May 12, 1993) stated her intent to collaborate on the project.

The 1994 Computer Assisted Language Instruction Consortium (CALICO) convention held in Flagstaff, Arizona, March 14-18, brought more evidence of current interest in distance education for foreign language teachers. The Goethe Institute and the American Association of Teachers of German have recently launched the "Long Distance Learning Project" to introduce secondary school German teachers to technology (personal communication with Professor Donna Van Handle, Flagstaff, Arizona, March 18, 1994).

Thus, the literature review, informal telephone survey, and a recent conference indicate the need for a distance education course on technology and language learning for in-service teachers. This need reaches beyond Utah and is indeed a national need. Therefore, the InsT/Ling 640 project will design and develop such a course to serve as a national model as well as meet the needs of Utah's foreign language teachers. The InsT/Ling 640 project will work closely with Professor Van Handle to ensure an exchange of information with the newly formed Long Distance Learning Project.

Initial implementation of the course will occur fall quarter 1994. National dissemination of the model will take place through the conferences and publications of professional organizations such as AECT (Association for Educational Communications and Technology), ACTFL, NEC, NFLRC, and TESOL.

Vehicle and Highway

Current popularity of the information superhighway idea provides material for a metaphor useful in delimiting the development of the proposed course. One can think of the distance education medium as a highway and the course as a vehicle that will travel on that highway. Course development efforts will focus on the vehicle, not on the road. Thus, this project will not address the design and creation of a distance education system. Rather it will design a course suited to the Ed-Net facilities available at USU.

However, to provide a model applicable nationwide, the project will identify media alternatives for all key course design components. The result will be analogous to a four wheel drive vehicle effective on single lane dirt roads or concrete freeways.

The Distance Education Research Matrix (DERM) concept will serve as a design tool for constructing this all terrain course. The DERM grew out of a shortcoming identified in distance education literature. The literature review revealed a lack of systematization of distance education research results. This comes from the extreme breadth of the distance education concept, a concept that includes many different technologies used to teach widely differing subjects to a broad spectrum of learners.

To systematize the design process and provide the basis for future research, the DERM proposes a three dimensional design space with learner variables as one axis, subject matter as another, and the means of instructional delivery as the third. In this system one can map out and identify the key design cells, e.g. how to demonstrate the functioning of a computer program to adult learners when synchronous audio and video are the only media of instruction available.

To counterbalance this Cartesian approach, the project will also use a non-deterministic design technique based simply on the dimensions of human interaction. The Human Interaction Design (HID) technique inventories the types of stimuli that might be used in interaction about a certain subject with certain types of learners and then selects those stimuli most appropriate for the media available. For example gustatory and olfactory cues play an important role in learning to cook. However, since TV does not convey such stimuli, TV cooking courses must design around this lack with verbal comparisons, e.g., Continue simmering the stew until the meat has absorbed the taste of the garlic.

In the study of technology, students often learn best from hands-on experience with the particular configuration of equipment and materials under study. Since many distance education systems, including the Utah Ed-Net, do not provide networked computer equipment at the remote sites, the course design will address this limitation. For example, the syllabus will include at least one weekend seminar at a site where students will be able to get hands-on experience.

Industry-Academe Networking and Course Rejuvenation

To increase hands-on opportunities, cooperative agreements with the instructional technology industry, with professional organizations, and with public and private schools, colleges, and universities will be an integral part of the course. Course preparation guidelines will require renewal of these agreements each time the course is offered (annually or biannually as presently planned).

This approach will not only increase the opportunities for direct interaction with technology and technologists but will also effect a continuous updating of the course, an essential feature in the study of a rapidly changing field.

The Course Development Process

Course development will employ Thiagarajan's Expert Verification and Revision (EVR) — Learner Verification and Revision (LVR) approach (1978). A panel of experts will review course design concepts and products, suggesting revisions as needed. Then a panel of potential course participants, in this case secondary level teachers of foreign language, will do the same. This review will occur before the course is taught for the first time in a stage termed "preproduction formative evaluation" (Flagg 1991).

Professionals from the field of foreign language technology and instructional design will make up the expert panel. Teachers from the Richfield, Utah area will constitute the learner panel and will include the proposed co-instructor of the course, Mr. Larry Black, a teacher of Spanish at Richfield High School.

Essential Course Concepts

Language courses should not focus solely on language learning. Rather they should also endeavor to motivate students to become long-term language learners. Otherwise attrition eliminates the majority of language students before they acquire adequate fluency. Few if any students achieve useful proficiency in the first two years of language study, yet most students give up before reaching the third year. Figures from ACTFL for secondary-school foreign language study indicate 73% attrition between the start of first year and third year courses (Dráper 1991). Some students will, of course, drop out before the end of third year while others who complete the course will not reach an adequate level of fluency.

Thus, probably less than 20% of the high school students starting basic foreign language study every acquire any useful mastery. One can conclude that unless first, second, and even third year foreign language students become long term learners the public school and personal investment in foreign language instruction is largely wasted.

Technology can help avert this waste by promoting long term language learning in at least two important ways:

First, appropriate technology can motivate students in the language class through the experience of fluency in relevant and interesting domains of the foreign language. Multimedia courses such as *French in Action* (Capretz 1987) and *Destinos* (VanPatten, Marks, and Teschner 1992) integrate video with course design to facilitate such experiences.

Secondly, appropriate uses of technology can offer learners options for pursuing their language studies on their own when necessary and can also help generate the élan needed to keep up the effort. These options include multimedia courses available through public libraries and the Public Broadcasting System (PBS). They also include the rapidly expanding field of international telecommunications, such as foreign TV and computer-aided information exchange services, e.g. Minitel.

Course Components

The course will consist of five primary components:

- Weekly distance education sessions two hours in length;
- Guest discussants;
- At least one weekend face-to-face seminar to provide hands-on experience;
- A course syllabus containing the schedule of activities and defining course requirements and procedures;
- An expanded syllabus containing an anthology of articles on TALL and a bibliography of recommended additional readings;
- A collection of videos on technology and language learning;
- Two books as required reading:

  Language, Learners and Computers (Higgins 1988),
  The Video Connection (Altman 1989).

THE ANTHOLOGY OF READINGS

To promote a broad grounding in TALL the project will assemble an anthology of readings on TALL. These readings will include the English-language or translated seminal works appearing since 1984 in the leading US TALL periodicals:

- *Athelstan Newsletter*
- *Foreign Language Annals* (ACTFL)
- *CALICO Journal*
- *Die Unterichtspraxis,*
- *JETT/IALL Journal*
- *Modern Language Journal* (MLA)
- *Northeast Conference Newsletter*
- *Technology and Language Learning Yearbook* (Athelstan)
- *TESOL Journal*

The readings will also include selections from bound volumes such as the two National Textbook Company books edited by William Flint Smith:

Modern Media in Foreign Language Education (1988)
Modern Technology in Foreign Language Education (1989).

The panel of experts will participate in the selection of articles for inclusion in the anthology.

The project will seek a publisher for the anthology and will also seek collaboration with one or more universities whereby graduate students and professors would conduct a yearly review of new literature for possible additions to the anthology.

The Bibliography

Important works for which the anthology has no room will constitute the bibliography of recommended additional readings.

The Video Collection

The Language Acquisition Resource Center (LARC)/ National Foreign Language Resource Center at San Diego State University has commissioned development of a collection of videos illustrating exemplary applications of technology to language learning. Viewing and discussion of these videos will occur during selected weekly distance-education sessions.

Guest Discussants

Guest discussants will also make up part of certain weekly distance-education sessions. The panel of experts will help select experts to invite. Participation will be either in person or via telephone or tele-video and will depend on the willingness and availability of the invited experts.

Conducting the Course

Course initiation is scheduled for fall 1994. Dr. Eastmond will serve as primary instructor. Plans include the participation of Mr. Larry Black, of Richfield High School, Richfield, Utah. Mr. Black's experience as a teacher of High School Spanish will complement Dr. Eastmond's background in the teaching of university French as they use distance education technology to team teach this course simultaneously from two separate sites: The on-campus Ed-Net facility at Utah State University in Logan and the site in Richfield.

CONCLUSIONS

Due to the existing popularity of distance education for foreign language instruction and other subjects, many language learning technologists already have experience planning or managing distance education operations. Thus, one can pose two general questions.

First, what lessons does prior experience offer that are relevant to the design, development, planning, and implementation of a distance education course on the uses of technology for in-service foreign language teachers?

For example, prior experience could provide answers to questions such as the following that are of particular importance to course development:

- Do similar distance education courses exist already?
- What are the best examples of existing classroom courses of this nature?
- Whom should one consider inviting as a no-fee guest discussant?
- What are the best articles to include in the anthology and the best books for the recommended reading list?
- Who would be interested in assisting with the publication and updating of the anthology?
- What companies, institutions, or individuals would be interested in providing current software at no charge for use in the course?
- Which videos, either professionally or locally produced, should one include in the course?

Secondly, does this new course portend any changes that will affect language learning technologists or present any new concepts they might find useful?

Under this heading one could include the following sample questions:

- Will this type of course create a greater demand for lab services and other technological support among teachers who take it?
- Will the existence of this course make the rank and file of language teachers more or less favorable toward technology, e.g., will many teachers feel threatened?
- What implications does the concept of long-term individual study hold for the use of technology in foreign language learning and instruction?

AFTERWORD

The AECT '94 Conference (Nashville, Tennessee) and the IALL "Experiment in Teleconferencing for Lab Directors" (April 22, 1994) as well as the CALICO '94 Symposium in Flagstaff, Arizona, included a variation of this same presentation.

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Searching For An Interface

Yoshiko Saito and Thomas F. Abbott

INTRODUCTION

This paper focuses on the process of developing the human interface for a **HyperCard** software project. It first reviews the Apple Human Interface Guidelines. Next a few examples of interface design are presented for consideration. Then the authors' own project (**Business Japanese**) is reviewed as it grew from an idea to a workable design.

FROM "USER FRIENDLY" TO THE "APPLE DESKTOP INTERFACE"

"Apple's designers liked to compare the Macintosh to a toaster. You don't have to read a manual to use a toaster - its operation is intuitive" (Dvorak 1992, 11). While the early Apple PCs used a command line user interface, the jargon of that interface was much more like English than other machines of the day. In 1982, the Lisa introduced the mouse and the "Graphic User Interface" (GUI). It was based on ideas that eventually comprised the Macintosh operating system (OS), icons, menus, windows, and a mouse. This established the basic "look and feel" for Macintosh. All that has followed in the past decade has been refinement. Apple published their seminal books *Human Interface Guidelines: The Apple Desktop Interface* in 1987 and *HyperCard Stack Design Guidelines* in 1989, the basic reference works for this report.

The development of the Human Interface Guidelines, did not arrive full blown with all of the psychological, graphic arts, and ergonomic concepts cited in the reference books mentioned above. The **Finder, MacPaint MacWrite,** and **MacDraw** were the first applications for the Macintosh, and it seems that the guidelines more or less evolved simultaneously with or perhaps immediately after their introduction. (Apple 1987, xii). The following section summarizes Apple's Apple Desktop Interface.

APPLE DESKTOP INTERFACE GUIDELINES

Apple defines the human interface as "the sum of all communication between the computer and the user" (Apple 1987, xi). In describing their Apple Desktop Interface, they state: "One of the great advantages of the Desktop Interface is its consistency: a user who learns one application already knows a good deal about other applications... This consistency makes it easier for a user to learn new applications..."(Apple 1987, xi).

Apple recognized that computer users were no longer hackers — "People aren't trying to use computers, they're trying to get their jobs done" (Apple 1987, 2). So they developed a model of people doing work at a desk and then evolved this people focus into the "Apple Desktop Interface."

Development of the graphical user interface was based upon the idea of using symbols to represent actions and processes that would be done inside of computers. It must have taken a quantum leap of creativity to imagine that cute little symbols like a trash can could be selected by a cursor and that a substantial portion of the general public could learn to use such symbols to instruct their personal computers. As Apple approached the task of developing a graphical user interface, they evolved a set of guidelines that could be passed on to the developer community. The following list summarizes these principles of the Apple Desktop Interface.

GENERAL DESIGN PRINCIPLES

Use Metaphors from the Real World

- Use concrete metaphors and make them plain, so that users have a set of expectations to apply to computer environments. The desktop is the primary metaphor for the Apple Desktop Interface. Once users are immersed in the desktop metaphor, they can adapt to other elements that are consistent with both the desktop metaphor and the application.

- Whenever appropriate, use audio and visual effects to support the metaphor. For example, the physical activity of moving the mouse results in visible change on the monitor.

- Users want to feel that they are in charge of the computer's activities, and they want their tools to provide feedback. If an action will result in grave consequences, they want to be warned before anything happens and have a chance to back out of that action.

See-and-point (instead of remember and type)

Two paradigms shape the Apple Desktop Interface: First, users can see what they're doing on the screen, and second, they can point at what they can see, e.g. drag a file to a disk icon to copy it onto that disk. Users rely on recognition, not recall; they shouldn't have to remember anything the computer already knows. If the user must remember what an object does, the icon should give a strong clue as to its function, e.g. the trash can.

Consistency

A basic principle of the Apple Desktop Interface is consistency. This means that there should be a general set of skills that are consistent from one application to another. The standard(ized) elements of the Apple Desktop Interface insure consistency.

WYSIWYG

This strange acronym (wizzy-wig) is by now well known as standing for, "What You See Is What You Get." It refers to the idea that what one sees on the monitor should match what comes out of the printer.

User Control

"The user, not the computer initiates and controls all actions." Apple believes that people learn best when they are in control and can see the outcomes of their actions.

Feedback and Dialog

Applications should keep the user informed. Such communications should be brief, but not cryptic, and in the user's language.

Forgiveness

"Users make mistakes, forgive them." Users should be able to back out of anything. An extreme example of this is **Nisus**'s capability for up to 32,767 undos. If an action is not reversible, the user should be warned before proceeding.

Perceived Stability

One of the great strengths of the Apple Desktop Interface is its consistency; users are able to work in a stable interface environment. In a sense, this is an illusion of stability. The desktop remains a stable frame within which a great variety of computing tasks can be performed, from accounting to graphics to word processing, but users should be able to find familiar landmarks in this electronic desktop and comfortably go about their work.

Aesthetic Integrity

As people spend an increasing proportion of their time working with computers, perception of the human/machine interface becomes increasingly significant, and the aesthetics of this cyberspace environment become increasingly important. Visually unattractive displays detract from their effectiveness, so aesthetically pleasing screen design should be an important part of application design.

Principles of Graphic Communication

Graphic communication is the keystone of the Apple Desktop Interface. According to Apple, "Good design must communicate, not just dazzle. It must inform, not just impress" (Apple 1987, 9) In the Apple Desktop Interface, everything on the screen is graphic; icons, pictures, and all of the users data appears as graphics on the screen. When graphics are clear and consistent, the user is able to quickly learn and use applications.

Visual Consistency

The desktop environment as created by Apple has many concepts based in the real world such as files, folders, and the trash can. The way in which these concepts are presented should be believable and enable the user to transfer skills to the electronic workplace.

Simplicity

"Simple design is good design." Communication between users and the computer are mostly conducted through menu items, icons, buttons and dialog boxes. Messages should be simple and direct. Simple designs are easy to learn and use.

Clarity

There should be no ambiguity about the graphic element's function, sometimes text will be preferable. Application designs must be tested with users to be sure they do work as intended.

Summary of the Apple Desktop Interface

To summarize the Apple Desktop Interface, it is a deceptively simple concept in which users are quickly able to become productive. The interface relies upon a number of real world similes. For example, documents are called "files" and are stored in "folders," and unwanted files are put in the "trash." Graphic symbols are frequently employed to facilitate communication between computer and user. This electronic workplace is called the "Apple Desktop Interface." Developers are encouraged to keep within the constraints of the desktop interface models in order to ensure wide based user acceptance and hardware compatibility. The next section will present some basic human interface considerations as applied to building **HyperCard** stacks.

HyperCard Stack Design/Human Interface Guidelines

With the introduction of **HyperCard** in 1987, Apple empowered users to create their own applications, to become software authors (Culp and Watkins 1992). Soon after, literally thousands of people were writing **HyperCard** stacks. Learning about designing applications to be accessible for others is as important as figuring out how to do the task itself. This section looks at some design aspects of building **HyperCard** user interfaces.

HyperCard Guidelines

- Decide who the users are. This is the most important consideration affecting the design of any application. Are the target users experienced with computers, with Macintosh and with **HyperCard**? Defining the users is essential to designing the user interface. For example, a stack about how to use the Internet would be quite different if the target user audience were college students or senior citizens.

- Decide what the stack's subject is and what it is not. Decide the purpose of your stack; how much information you will cover, and how little.

- Decide how to present the subject matter to your users. Many other design considerations will fall into place after the presentation format is determined. For example; should you use a self running slide show format. vs. navigation system? Or, consider using a metaphor such as a book, a VCR, or a tour bus.

- Make your stack easy to navigate. There are any number of ways to setup the navigation system, decide on a system that is appropriate to the subject matter and the target audience.

- Users need to be introduced to a stack, not just thrown into it. Novice users will need "How to use this stack" type information, while experienced users will want to be able to bypass it and go straight to work, accessing 'Help' resources only if needed.

One way to do this is to make the stack simple and easy to use so that little learning is required. An example of this is the "Scanned Images" stack from Apple (Illustration 1). This stack presents a small gallery of scanned images to demonstrate the possibility of incorporating such images in your stacks. The only things a user can do is "Click anywhere to go to the next card," go to the "Home Card" by clicking on the little house icon in the lower right corner, or close the stack by clicking in the close box at the upper left corner of the stack's screen.

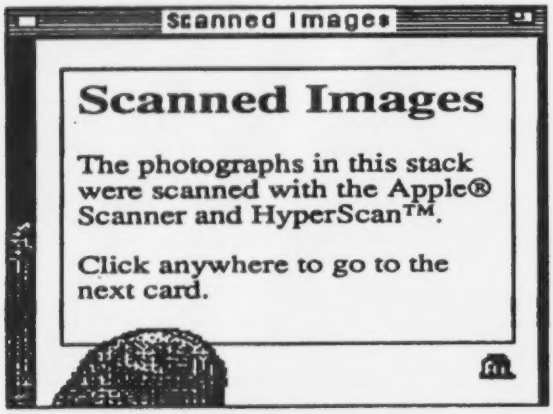
Scanned Images
Scanned Images
The photographs in this stack were scanned with the Apple® Scanner and HyperScan™.
Click anywhere to go to the next card.

Illustration 1. "Scanned Images"

- Integrate text, graphic design, and audio design. **HyperCard** allows developers to create buttons and text fields, use graphics, and add sounds to their stack designs. These elements have to work together as an integrated whole for users to be able to follow your ideas and get full benefit from the stack. When all of the elements work together, the user quickly becomes involved in working with the stack.

Some basic concepts to keep in mind

- Background designs should be consistent, any changes should reflect shifts in the subject matter, but maintain overall consistency. Place such things as navigation and control buttons in the same place on the screen, typically on the edge.

- Text should be written for the screen. Much of the communications burden will be carried by other elements, so the text writer has to always be aware of this and exploit the increased possibilities **HyperCard** offers.

- Graphics and sound carry so much information, it is worth the effort to have good graphics and audio resources. This is specially true when teaching language and culture with **HyperCard**.

- Plan on changing your stack several times. Stack design is an iterative process. It usually takes more than one pass to settle on a design. One way to work through this development stage is to design several promising solutions up to a point then try them out and choose one to carry forward.

- Test early, test often, and listen to your reviewers. This can not be stressed too much. Seek feedback and use it to refine your product.

- When you're finished, check the stack one last time.

This has been a brief overview of the human interface side of **HyperCard** stack design. The final section will look at a few specific examples of stack design and evaluate them from the human interface perspective.

Some Sample Interface Designs

Illustration 2 is a fairly simple, clean interface. There are only five control buttons; Top, Back, Forward, Sound, Intro(duction), and Quit. Users should not have any trouble getting started with this stack, but there is at least one button that, at first glance, is unclear as to it's function. That is the "Top" button, an up-arrow, which means "go to the first card." The **HyperCard** convention, however, is to use a left arrow facing a bar, (|<=), for that purpose.

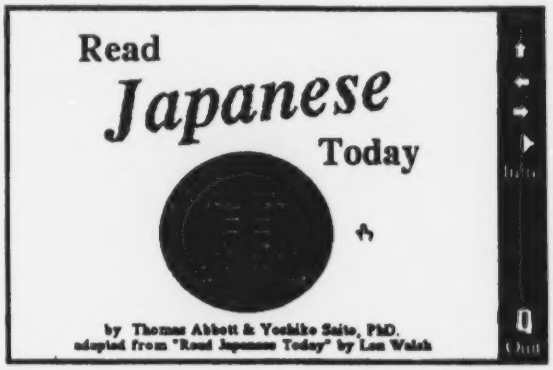

Illustration 2. A Test Design for a Reading Stack

Illustration 3 is taken from a shareware stack. The major shortcoming with this design is a lack of guidance. Also, the graphic design is unbalanced and there appears to be no reason for it. Clicking on the "Create a Bee" button causes an unlocked text field to appear covering the "Create Your Own Bee" text and inviting you to buy the full stack. Clicking on the "Spelling Demons" button brings up a short spelling test. Finally, there are no navigation tools visible.

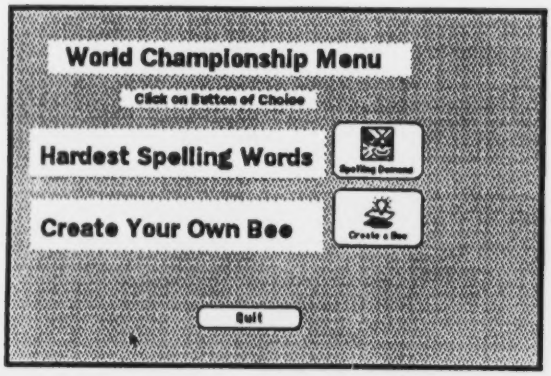

Illustration 3. Spelling Bee Stack

Illustration 4 is the first start-up card for "Business Japanese." At this point, the project was still in its early stages and we were getting a lot of on-the-job training. At one time, we had a number of different interfaces on different cards within the stack depending on that card's function. The main problem with this screen was that it did not hint at the richness of **Business Japanese's** (BJ) content.

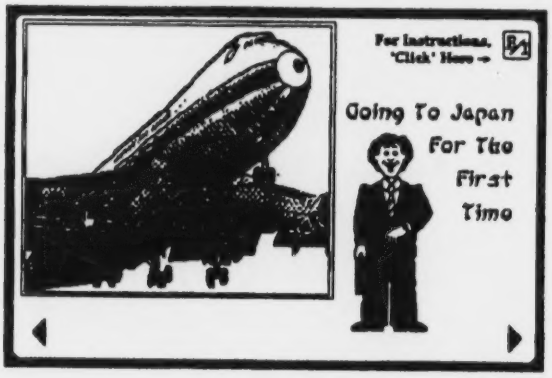

Illustration 4. First Start-up Card for ***Business Japanese"HyperCard****Project (9/92)*

The current design shown in Illustration 5, has a uniform background for the whole stack with inactive buttons "grayed out." We found that a number of non-Japanese students were using the stacks, so titles were added to the control buttons. Finally, we cleaned up the icons and revised the "Help" system to explain the functions of the buttons for inexperienced users.

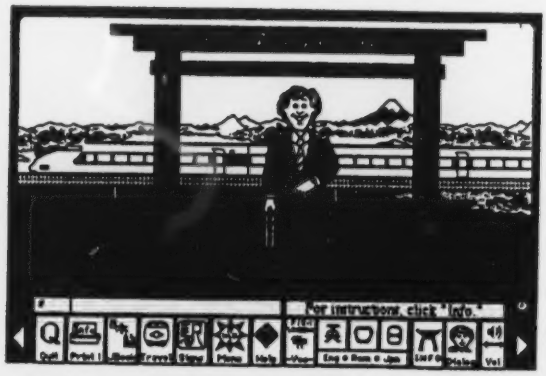

Illustration 5. Final Start-up for ***Business Japanese HyperCard*** *Project (11/93)*

CONCLUSIONS

The human interface may well be the most important aspect of any tool that people use. At this point in time, the Graphical User Interface (GUI) seems to be in ascendancy as the computer interface of choice. Apple did not invent the GUI, but they refined it in the Apple Desktop Interface to the point that wide spread use and adoption could occur.

HyperCard is a development shell that operates inside the Apple Desktop Interface. Since it is possible to completely hide the Apple Desktop Interface and create a new user interface, Apple has gone to considerable lengths to provide guidance on interface design for **HyperCard** developers. Learning about interface design should be the first step for new **HyperCard** developers.

This year marks the tenth anniversary of Macintosh. Along the way, system software has evolved and at each stage the Apple Desktop Interface has become more refined, more highly articulated. Some writers have speculated that the current finder had reached its limit and a new design metaphor is needed. (Lu 1994). As we saw in *Star Trek V.*, when Scotty tried to talk to the mouse, the future direction of interface development seems fairly obvious. There will probably be a few intermediate developmental stages, but the ultimate design will be an interface so transparent that we can simply interact with the computer as if it were another person.

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ENHANCEMENT OF STUDENT STRATEGIES FOR AUTHENTIC LANGUAGE COMPREHENSION THROUGH HYPERMEDIA

KAREN SCHAIRER

ABSTRACT

Second language students must develop strategies to take advantage of authentic language input or their communicative skills may stagnate outside the i+1 classroom environment. **ACCESS**, a **HyperCard**-based interactive-audio program is designed to complement unsubtitled foreign language videos. Students navigate among eight types of input and activities according to their interests and linguistic needs. Two program versions have evolved from the pilot study. One demands that students create and find answers to their own questions. The second provides student-generated questions, feedback, and clues. The effectiveness of these two procedures is analyzed in terms of affective response and comprehension levels achieved.

INTRODUCTION

ACCESS is an experimental **HyperCard** template designed to provide second language students at the university level with various types of activities to mediate between their limited language skills and the demands placed on them by foreign language films, especially those without subtitles. Within the basic format of the program, activities are added, deleted, or modified as student response leads us to evaluate the program's effectiveness.

The Input Hypothesis, an integral component of Krashen's Natural Approach to language acquisition, contends that conversational fluency is acquired when learners are exposed to and understand messages that are a little beyond their current ability. In the beginning stages of formal second language acquisition, comprehensible input is made available by instructors, fellow students, and short practice tapes and videos. Teachers and sympathetic native speakers tailor their conversation based on their perception of the skill level of their non-natives interlocutor. Krashen refers to such language input as i + 1. Language, the Natural Approach hypothesizes, is "picked up" from target language conversations that are comprehensible enough for the listener to connect meaning to new linguistic forms with the aid of context. Unknown words and language structures are gradually acquired as long as the general conversation can be understood.

The expression "picked up" might seem to imply that acquisition of listening skills is automatic. Listening skills, however, must be nurtured. Parks (1986) explains that students must be exposed to a great deal of natural and authentic listening experience at all levels. Texts and tasks must be matched to the listeners' abilities and the listeners must be prepared with guides, background information, and vocabulary lists.

Even so, the majority of university graduates who complete a four year program of foreign language study are still faced with serious limitations in a native-speaker environment. Studies in Texas (Hiple 1987) indicate that 74.8% of college seniors achieved the intermediate-high rating on the ACTFL scale. In terms of listening skill, the Intermediate-High rating certifies that the person is "able to sustain understanding over longer stretches of connected discourse on a number of topics pertaining to different times and places; however, understanding is inconsistent due to failure to grasp main ideas and/or details." "Longer stretches of connected discourse" must be understood in terms of the guidelines for the Intermediate-Mid listener who is "able to understand sentence-length utterances which consist of recombinations of learned utterances (including) some deliberate speech, such as simple announcements and reports over the media." At the Intermediate-High level, then, students still have a long way to go. To achieve professional proficiency, they must improveafter graduation, progressing from Intermediate-High to Advanced and finally to Superior.

Those who leave the learning environment dependent on reduced speech for adequate comprehension find limited sources of appropriate i + 1 unless they come in regular contact with sympathetic native speakers. Their receptive skills are not sufficiently developed for them to take full advantage of the language input provided by radio, television, movies, theater, and print media designed to appeal to native speakers. Too often even language teachers, whose primary conversation partners may be their students, confess that their skills decline rather than improve over time.

Foreign films with subtitles circumvent the problem of comprehension but do not necessarily bridge the gap between the non-natives' i + 1 and native speech. Viewers may focus so intently on the written word that they are only minimally conscious of the spoken language, particularly if the subtitles are difficult to see. In addition, the gap between what is spoken and what is written is frequently so great that the meaning imparted may get in the way of comprehension of what the actors actually say. Without subtitles, however, foreign language films may be so far beyond the linguistic ability of students that they "tune out," missing through inattention exchanges they might otherwise have understood.

ACCESS

The **HyperCard** program **ACCESS** has been designed to help foreign and second language students develop the necessary skills and strategies they need to take advantage of second language input available beyond the classroom. The pilot provides a specific program for use in the language laboratory to help second language students with less than native competence comprehend the unsubtitled film version of "Martín Fierro," a classic Argentine epic poem. When successful, the program will provide a template for use with other foreign language films without subtitles. The second goal of **ACCESS** is to gradually determine the type of task and computer assistance most appropriate for second, third, and fourth year language students. The last goal is, through variation and experimentation with the program and in conjunction with student input, to determine which activities help learners develop the most effective strategies for second language comprehension outside the formal learning setting, in situations where the input is frequently more complex than the optimum i +1.

The film "Martín Fierro," selected for use in the pilot project, has many features which recommend it as a student's first experience with an unsubtitled film. It evolves around a single character with limited point of view and focuses on a single sequence of events narrated in chronological order. Though the film is an hour in length, there is a logical stopping point after slightly less than forty minutes. The film also has some disadvantages, the first of which is that it is foreign and does not conform to many students' expectations. The situation is alien to them, there is no love interest, and it does not have a happy ending. Presentation of background information sparked the interest of several but not all students.

PILOT STUDY

Participants in the pilot program were required to watch the first portion of the film , spend a minimum of a half hour exploring the computer program, and watch the film a second time They were given a week to complete the project with the following instructions:

I. Watch the film "Martín Fierro" until the scene where he breaks his guitar, approximately 40 minutes. Scribble your notes with your eyes on the screen and your earphones on. Jot down greetings, names or isolated words you hear, and if you can, the first words of lines. Don't worry about spelling. Also, write questions that occur to you as the film progresses. What is it you don't understand in the various scenes? What confuses you? Are there actions or reactions that do not seem to make sense? This is the perfect time to use your imagination and intuition. Ask yourself, what is the mood of the scene? How are the characters responding to each other? What do you think that the characters are feeling? What do gestures and facial expressions suggest to you?

II. Use the computer program that accompanies the assignment to enhance your comprehension of the film. Explore the program for at least a half hour. You may wish to read about the author, about Argentina, or about gauchos. You may look up the first words of sentences you jotted down in the Index of First Lines to see the full text, or follow the Guide from scene to scene to get a feeling for the action. Remember that you may hold the mouse button down on words marked with a small cross for vocabulary help.

III. Watch the film again, up to to the broken guitar scene. Listen for the selections of dialogue you looked at in the computer. Relate what you learned about gauchos and Argentina of the period to the film. Try to answer some of your own questions. Turn in your scribbled notes, your questions, answered and unanswered, and the survey sheet.

Before discussing the preliminary results of the pilot study, we will first give a brief description of the actual computer program. The title page and credits are immediately followed by an index with **HyperCard** buttons that take the student directly to the topic selected. Students choose among eight possibilities:

- instructions for use of the program
- an introduction to and summary of the film
- a biography of the author
- maps and facts about Argentina
- a description of the gaucho
- key stanzas from the text
- an index of the first lines of all stanzas
- a visual guide to the principal scenes within the film.

Instructions describe features available, what to expect in each file, and meaning of the symbols used such as buttons and boxes, arrows and crosses.

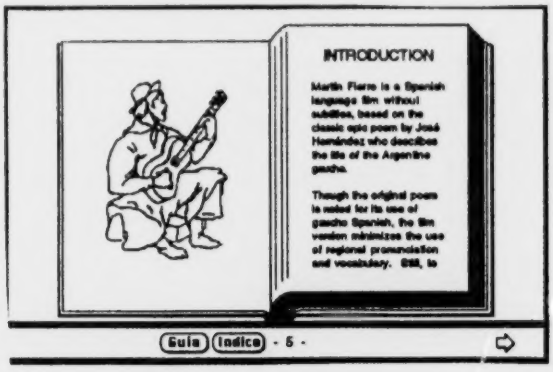

Figure 1. The Introduction

Introduction provides a synopsis of the film, discusses the relationship between the original epic poem and the film, and comments on Argentine regionalisms.

Goals and Strategies suggest ways of approaching the film for maximum understanding.

Index of first lines is a navigational tool which allows students to find the complete stanza if they caught the first words.

The Author presents a brief biography and scanned image of José Hernández.

Argentina includes maps, a brief history of Argentina before and after the arrival of the Europeans, a description of the area in which the action takes place, and a section describing the indigenous peoples of Argentina to whom Martín Fierro turns for refuge at the end of part I.

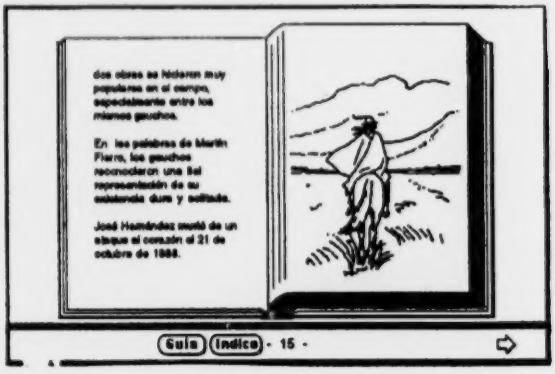

Figure 2. The Gaucho

The Gaucho presents pictures of the man, description of his life and possessions, the role of music, games of chance, the horse, the tea known as mate, knives and bravado, and his eventual transformation from bandit to folk hero symbolizing the love of freedom.

The Guide is a pictorial reference to the major events depicted in the film. Clicking on one of the pictures within the guide takes the student to the appropriate text.

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Figure 3. The Text

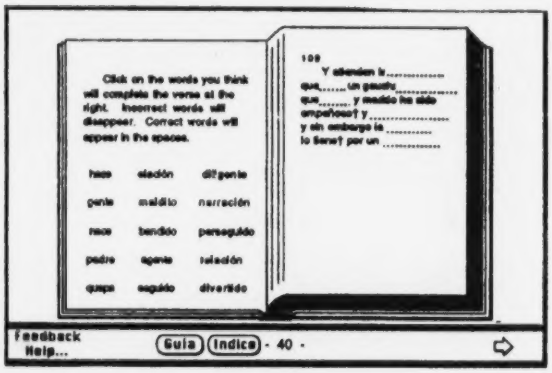
Click on the words you think will complete the verse at the right. Incorrect words will disappear. Correct words will appear in the spaces.
Feedback
Help...
Guía
Indice
- 40 -

Figure 5. Activities

The Text provides the key verses from the film in order. Both the Index of first lines and The guide transport students to specific stanzas within this section. Regional or uncommon words are flagged with a superscript cross. Holding down the mouse button on these words brings up a definition, synonym, picture, or short explanation in Spanish. Each page of the text is accompanied by activities designed to encourage mental processing and educated guesses. Feedback for both correct and incorrect answers offers helpful clues, cultural insights, and additional clarification. Students are rewarded for making the effort. On some pages there are simple line drawings to evoke echoes from the film and provide clues. Upon resolution of a program/hardware incompatibility problem, sound will be available at each text card, and students will be able to listen to the verses. An entire sequence of activities is being developed to take advantage of this feature.

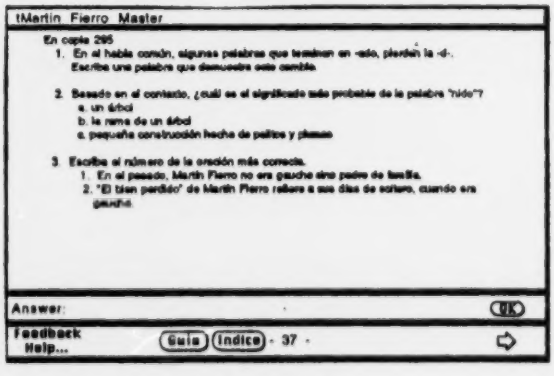

Figure 4. Activities

RESULTS

In the pilot study, forty university students, half in third and half in fourth semester Spanish watched the film "Martín Fierro," worked on the computer program for a minimum of a half hour, and then watched the film a second time. Upon completion, each student filled out a questionnaire which asked whether they thought they understood more actual words the second time they saw the film than the first time, and also had them rate, on a scale of 1-5 (5 = best), their reaction to the various sections of the computer program. The survey was turned in along with their scribbled notes, questions, and a 150 word summary of what they understood.

The average ratings of the program sections across all raters place The Gaucho and The Text at the high end of the scale (3.8) and the first lines of Stanzas at the low end (3.1). The fourth semester students award generally more positive rating to all features than do the third semester students. The only exception is for the Introduction, rated higher by the third semester students. Interestingly, this is the only portion of the program where the text is in English. In all other sections the text is in Spanish and third semester raters award lower scores to them than do forth semester students.

Students also rated the program sections in terms of useful and not useful, interesting and uninteresting. The Gaucho was generally found to be the most interesting and useful, followed closely by The Text and The Guide. No one found the Goals and Strategies section to be the most interesting, and the First Lines received a single vote. The remaining items were scattered across the spectrum. Students did distinguish between sections they found useful and those they found interesting. The Vocabulary Helps,

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The Text, and The Guide were occasionally listed as least interesting but most useful by the same student. Obviously some of the sections, particularly the Goals and Strategies, need to be reworked. The use of First Lines may require more explanation or greater skill on the part of the students.

A review of the questions written by students shows that roughly two-thirds of those jotted down during the first viewing were answered during the second. It appears that the process of recording questions and seeking answers to them in a subsequent exposure to the film may be the most effective student strategy to date. With their own questions in mind, students remain more alert, and by becoming active rather than passive listeners, are better able follow the development of the film.

Overall, when asked to rate on a scale of 1 to 5 their comprehension after the first viewing of the film and their comprehension after computer use and the second viewing, 3% indicated no change, 57% indicated that they had improved one level, 37 % indicated an improvement of two levels, and 3% indicated an improvement of 3 levels.

The second second set of participates in the **ACCESS** pilot study were thirty fourth-year Spanish students. Although these students had studied Spanish at least twice as long as the earlier participants, they felt the same lack of comprehension after the first viewing of "Martín Fierro," bringing to mind the thought that if a man can't swim, he can drown as quickly in seven feet of water as in seventy. Though these students' questions and essays indicated that they had, in fact, understood significantly more than the second year students, their frustration level was about the same.

Average ratings of the program sections favored The text (4.2) followed by The Gaucho (3.9). The greatest difference was the increased valuation of the first lines of stanzas, seen as most important after The text and The Gaucho (3.1). The Introduction, rated higher by the third semester students than fourth semester students, was all but ignored by the fourth year students, and The goals rated a scant 1.8.

Statistical analysis of the data will determine if these apparent differences are in fact significant. It will be interesting to note, as data comes in for students in the four upper division semesters, whether the level of proficiency impacts on ratings.

PHASE II

The next phase of the study will allow students to access recordings of the text as they proceed through the program. A new set of cloze, vocabulary, and comprehension exercises will take advantage of the students' ability to access sound, reducing to a degree the amount of print text made available to encourage receptivity.

In the long run, the most important goal of the computer program **ACCESS** is the development of greater strategic proficiency among second language learners and the enhancement of their ability to make use of limited linguistic resources to understand input. Comments by students indicate that more must be done to increase their tolerance for the unknown and to validate comprehension gleaned from paralinguistic sources. Many students rate as unsatisfactory anything less than complete verbal comprehension and request listening projects in which they "can understand everything."

Given the nature of the input available to most language graduates, the possibility of continuing to improve their language proficiency after leaving the formal classroom may hinge on development of personal strategies for benefiting from less-than-comfortable situations where much is unknown. It is hoped that, as it develops, the **ACCESS** program will guide students toward active participation in the development of their own strategies for overcoming the i + 1 barrier in the real world.

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PRESENTER'S BIODATA

Karen E. Schairer, M.A. Latin American Studies, Ph.D. Spanish Linguistics, is an Assistant Professor of Spanish at Northern Arizona University. Dr. Schairer's research interests include language acquisition enhancement through multimedia and L2 pronunciation and comprehension. She has been involved in computer access for *Imágines*, eleven commercial audio tapes for Latin American studies in Spanish and in the development of **In-formation**, a **HyperCard**-based, student interactive, Latin American studies updatable information base including chronological news briefs from the Hispanic press.

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IMPROVING COMPREHENSION: INTERACTIVE VIDEO FOR FIRST-YEAR STUDENTS FROM AUTHENTIC FRENCH TELEVISION

SANFORD SCHANE

ABSTRACT

The presentation demonstrates and discusses an interactive video that utilizes a short (approximately 2 minutes) authentic excerpt from French TV. The program is intended to improve aural and reading comprehension at the first-year level. The conception and development of the program took place last summer at a week-long workshop for the **LIBRA** authoring system conducted in cooperation with LARC at San Diego State University.

DEMONSTRATION (THE VIEWER *QUA* STUDENT)

The viewer watches the excerpt in its entirety. S/he is then presented with a series of graded activities eliciting responses regarding the content of the video and deductions derivable from the content. Wrong responses branch to subroutines that explain crucial vocabulary or redirect the viewer to relevant portions of the video. The program then presents a printed version of the text of the video. The viewer is able to use an on-line lexicon linked to the video for looking up words and expressions that are still unfamiliar.

DISCUSSION

The program was tested with a small group of first-year French students (12) taking an intensive course last summer at the University of California, San Diego. The program was neither geared to the curriculum nor graded; yet all students participated, using the program individually in the language laboratory. Students completed the program in 15-30 minutes. They responded to a questionnaire about the different features of the program (for revision) and rated their comprehension level at different points throughout the program. These beginning students seemed to derive satisfaction from being able to understand authentic French television.

PRESENTER'S BIODATA

Sanford Schane, Professor of Linguistics; Director of Linguistics Language Program, University of California, San Diego. I attended my first CALICO meeting last year at Williamsburg, knowing little then about computer assisted language instruction. This past summer, I participated in a **LIBRA** workshop, producing my first program which is described above. I can personally attest that it is possible even for neophytes to create exciting and successful materials for language learning.

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DATA COLLECTION IN CALL PROGRAM

MARC NEIL SISKIN

ABSTRACT

Data collection should be an important part of CALL since justifying the use and expansion of CALL activities may be facilitated when relevant supporting data can be produced. In this presentation several means of collecting various types of data will be discussed.

The Office of Instructional Technology at the University of Michigan has designed several data collection routines for multimedia computer assisted instruction. Each routine generates data on how the programs are used by learners. This data has fueled research on the effectiveness of the methodology for each of the programs developed on campus. The results of this research prove invaluable in the modification of existing courseware as well as in the development of new programs.

Another reason for data collection is to assist the instructor and the student in determining areas where the student has succeeded and those areas where the student has not mastered the material. Many programs provide a means of tracking the progress of the user. The instructor can use this data to pinpoint problems which an individual student may have with a particular skill area. Then, specific strategies can be prescribed to tutor the student in these skills. Examples of the collection routines as well as the data that is generated will be demonstrated.

Another type of feedback is the reaction of the user to the program. A **HyperCard** stack which provides an opportunity for the learner to give feedback will be shown and will be available to people attending this presentation

PRESENTER'S BIODATA

Marc Neil Siskin is Senior Media Designer at the Language Resource Center (LRC) at the University of Michigan. Some of his responsibilities include, managing the new computer cluster installed within the LRC this past summer, consulting with faculty on how to use CALL in their classes, as well as being the LRC's satellite and video J.O.A.T. (Jack of All Trades).

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The Barcode Connection

Alice Slaton and Claire Saint-Léon

ABSTRACT

Learning and teaching a foreign language with vivid examples of language and cultural situations are best done on videodiscs and compact discs. Barcodes support and complement the video, audio, and print media to powerfully enhance the experience. Yet it is so easy to use and economical. This presentation will use videodiscs and compact discs to show various strategies for the barcode connection.

INTRODUCTION

I was racking my brains to come up with a good introduction for this presentation when Itiel, a writer friend of mine reminded me of the grocery store. He said, "don't you remember when lines at the grocery stores moved at a snail's pace because the clerk manually punched in the price of every item? And if the clerk inadvertently pressed the incorrect number, you had to wait even longer, right?" With the invention of barcodes, the lines at fast food stores, grocery stores, and department stores move light-years faster. That same technology is being applied in teaching and learning, in all levels of education from elementary schools to colleges and universities, and in all disciplines from math, science, and engineering to humanities, art, history, and languages.

BARCODES ARE HERE TO STAY

There are more than 2,000 education courses using barcodes. Today's textbook publishers are including barcoded textbooks along with videodiscs. As educators, it is to our advantage to keep pace with this new technology.

For the Beginner

This new technology offers a simple, economical, and instructional solution for the teacher who wants to get started in new technology. An innovative technology using barcodes can benefit the learner and teacher in the classroom and in the Learning Resource Center (LRC). Barcode readers are simple to use. Even a six-year-old can use the barcode reader. The user places the self-scanning head over the barcode and then sends the code to the player. That's all.

For the Savvy Computer User

Barcodes are also useful for designing and testing pilot programs for feasibility studies and research.

Barcodes are Standardized

In 1989, Pioneer introduced the first known barcode system designed to control a laser videodisc player. While Pioneer holds the patent on Laser Barcodes, Sony and Panasonic have contributed to the development and support of the standard.

Barcode Systems are Economical

It is cost-effective to use the barcode reader with audio CDs and laser videodiscs. A computer is not needed. All one needs is a videodisc player connected to a TV monitor, an optical disc, a barcoded manual, and a barcode reader.

Barcodes Offer Instant Access, Accuracy, and Instant Replay

Unlike videotapes and audiotapes which are sequential media, the optical discs are random access media. Random access media allow the user to access a video or audio segment instantaneously and accurately. The barcode reader allows the user to replay any selection as often as needed.

Barcodes Offer Top Quality of Full Motion Video and Interactivity

Moreover, barcodes plus paper-based designs can be customized to fit your interactive needs. There is no loss of quality of the information on videodisc or audiodisc for the lifetime of the medium.

Barcodes Can Be Used for Prototypes

Computer programming can be complex, expensive, time consuming, and frustrating. So before investing in complex programming, it is advantageous to do a prototype using a text and barcoded manual. The interactive designs are then easily tested and modified.

Barcodes Are Great Back-ups for Presenters

Barcodes are a reliable portable back-up for the presenter in the event of hardware or software malfunctions.

HUMAN FACTORS AND ERGONOMICS

Ergonomics is the science of making efficient machines and computer gadgetry more comfortable and safe for the user. A case in point is the scanner. The Pioneer barcode reader UC-V108BC is the easiest to use of the three models available. It has a self-scanning head, and offers many operational functions: Play, Pause, Still Frame/Step Advance and Reverse, Scan Forward and Reverse, Chapter Skip/Track Skip as well as a Display/ Index button and Audio Select button.

Another barcode reader on the market, UC-V104BC, is limited only to read, send, and repeat functions. The scanning is done by moving the reader left-to-right over the barcode, an action that requires some practice.

The UC-V109BC features eight operational functions buttons: Play, Pause, Still Frame/Step Advance and Reverse, Scan Forward and Reverse, and Chapter Skip/ Track Skip. The scanning is done by moving the reader left-to-right over the barcode.

Barcodes readers may be used wireless in distances up to 25 inches, or wired.

ROYALTY-FREE BARCODE SOFTWARE

If you want to make your own barcode programming, you need a computer and a software package that can produce barcodes. Pioneer is offering royalty-free licensing of its LaserBarcode technology, the **Bar'n'Coder** on the Macintosh computer, to publishers, developers, and hardware manufacturers. The LaserBarcode format is used with more than 1,000 instructional Laserdisc titles today. For more information contact: Tracy Hickey, LaserBarcode Licensee Program Manager, Pioneer Electronic Corp., Upper Saddle River, New Jersey; (201) 327-6400. *Higher Education Product Companion (HEPC) Journal*, Nov/Dec 1993, Volume 3, Number 3, in the News section, page 9.

The **Bar'n'Coder** software is a **HyperCard** stack. The following three graphics represent the first card of the **Bar'n'Coder** for audio CDs, extended play (CLV) videodiscs, and standard play (CAV) videodiscs.

AUDIO CD

On this card the section highlighted is **Time Seg Play**. The definition of this function is explained below the CD **Bar'n'Coder** 3.0 title. **Time Seg Play** means that the specified time code segment from beginning to the end will play on the CD. The player searches for the beginning time, in this example it is 00 minutes, 7 seconds, and 7 bits. It continues playing until the specified ending time; in this example it is 0 minutes, 15 seconds, 0 bits.

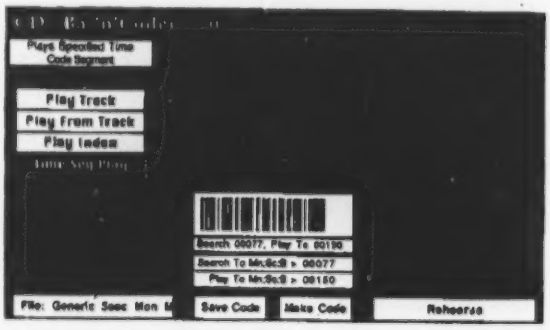

Figure 1.

EXTENDED PLAY (CLV) VIDEODISC

Extended play (CLV) videodiscs offer one hour of motion video per side. This format allows random and instant access to the closest second of time.

On this card the section highlighted is **Play Time**. The definition of this function is explained below the LD **Bar'n'Coder** 3.0 title. **Play Time** means that the specified time segment from beginning to the end will play on the LD. The player searches for the beginning time, in this example it is 00 hour, 28 minutes, 25 seconds. It continues playing until the specified ending time; in this example it is 0 hour, 30 minutes, 24 seconds.

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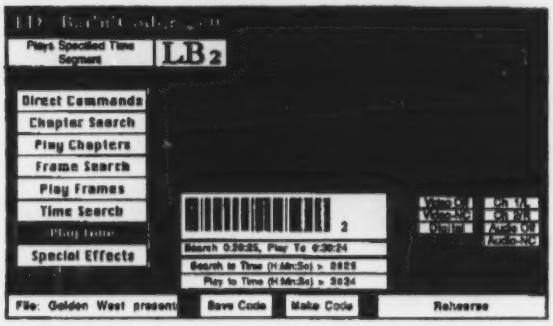

Figure 2.

STANDARD PLAY (CAV) VIDEODISC

Standard play (CAV) videodiscs offer thirty minutes of motion video per side. That format allows random and instant access to each frame.

On this card the section highlighted is **Play Frames**. The definition of this function is explained below the LD **Bar'n'Coder** 3.0 title. **Play Frames** means that the specified frame segment from beginning to the end will play on the LD. The player searches for the beginning frame, in this example it is frame 53101. It continues playing until the specified ending frame; in this example it is frame 54000.

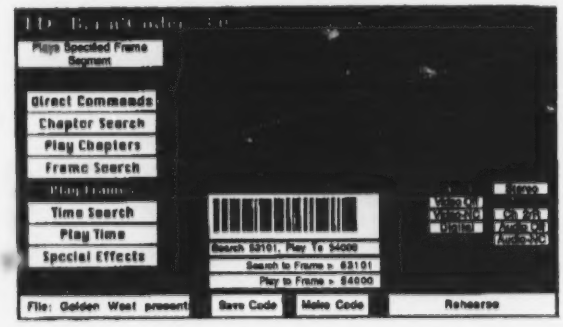

Figure 3.

BARCODE SERVICES

There are services that will program readymade or custom barcodes to meet your needs. For custom barcodes you need to give the service bureau beginning and ending frames number, or times of the videodisc or audio CD. A few days later, voila! Your barcodes are mailed to you on labels that you can photocopy and move around as needed.

CURRICULUM INTEGRATION

Videodisc and CD use in the classroom is an integral part of my lesson preparation. This new technology is not used as a change of pace or a fill-in classroom activity. Students are tested on all the material covered in the classroom. Technology is used to assist the student in better understanding and applying language concepts and culture. Given the renewed emphasis on building students ability to speak another language and appreciate other cultures, practicing language skills in the LRC continues to be essential. There, the students practice at their own pace, and it is as important as the classroom.

Here are a few examples using the song, "Mon Mec à Moi" from Patricia Kaas, two short lessons from *Fantastique!* and a scene from the French version of the movie, *Three Men and a Baby*.

In the song "Mon Mec à Moi," Patricia Kaas starts with *Il joue avec mon coeur...* (He plays with my heart). For French 1, an elementary level class, I focus on this sentence to learn the verb *jouer*. I dramatize emotions pointing to my heart or using a graphic image of a heart. Another sentence that is repeated throughout the song is, *Il parle d'amour comme il parle des voitures* (He speaks of love as he speaks of cars). I use this barcoded example to add instances of ER verbs. My students relate very well to the vocabulary of *amour, voitures* (love, cars). I may show a car, express exaggerated feelings for Monsieur Slaton, my husband. Students understand that context.

Mec: Il joue avec mon coeur
Search 00151, Play To 00300
Il parle d'amour comme il parle des voitures
Search 02162, Play To 02215

Figure 4 . Barcodes corresponding to audio CD "Mon Mec à Moi"

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In *Fantastique!* the lessons are based on phrases used in the authentic segments. The goal is to have the students appreciate, comprehend, and practice a targeted number of structures and vocabulary phrases. When students view the authentic segments, they are better equipped to listen with their eyes. Many will be able to use the material covered.

Here is a French 1 lesson on the months. The expression *En novembre 89* is in the authentic clip. That gave me the opportunity to introduce all the months.

Search 19186, Play To 19406
Complétez: sound + text
Search 19543, Play To 19578
Pratique & test: En.....?
Search 19577, Play To 19668
Réponse: Janvier 89
Search 19744, Play To 1985

Figure 5 . Barcodes corresponding to the month's lesson

Figure 6 . Barcodes corresponding to lesson on the negation

Figure 6 is another French 1 lesson on basic vocabulary and the negation: *Est-ce que c'est.... Non, ce n'est pas....* (Is it....? No it is not....).

Here is another example I use for visual, cultural, and linguistic information. In the movie *Three Men and a Baby*, one of the men goes to the *pharmacie-garde* (the 24-hour local pharmacy) to get food for Marie, their roommate's baby daughter. The baby's mother had left France for the United States. She left her infant on their doorstep. It is hilarious. These professional men discover first the tribulations, then the joys of caring for a baby.

Michel has to change Marie,she cries
He has to get formula, milk which one?
Search 0:11:11, Play To 0:12:10
Michel opens the door, the concierge
gives him a pack she sees the baby!
Search 0:12:11, Play To 0:13:28
Michel is hopeless,the otherslearning
about bottles.He comes backTheyfight
Search 0:13:29, Play To 0:14:27
Marie is crying, they have to find out
how old she is.No diapers! Michel goes
Search 0:14:27, Play To 0:14:58
The big diaper change!!
Search 0:14:59, Play To 0:16:34

Figure 7. Barcodes corresponding to the movie Three Men and a Baby

I make every effort to make the lesson design flow seamless. The students and I concentrate on the content of the lesson, our interaction, and participation. The technology is often forgotten.

My primary goal is to encourage active learning. This method using technology has enhanced first and second year French students' production skills: speaking and writing. My students and I learn to improve our problem solving skills. We use visual information: body language and non-verbal communication, gradually building on familiar words and phrases. All of that including guided cues help develop the "feel" and the use of the language.

The focus in teaching is slowly shifting from the teacher to the learner. In the interactive classroom, the students and their group work and activities are central. The teacher becomes a facilitator, a manager of instruction and learning.

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Teaching using technology is a challenge. Using barcode programming makes teaching and learning much easier. Barcodes are accurate, effective, flexible, and simple for the teacher and the learner. All that is needed is a discplayer, a video monitor, a barcoded manual, and a barcode reader. Let's take advantage of this technology.

Like learning a new language using barcodes, interactive learning and teaching with technology is a new way of thinking. It is imperative that we learn how to redesign our content expertise to make best use of these new tools.

Interactive communication is a new art form whose real concerns are not technical but emotional and intellectual. They must reach the mind and the heart of the learner.

Educational reform is a national priority of the nineties. Teaching and learning with interactive media is becoming a necessity in education today.

A FEW PRICES AND ADDRESSES

Barcode readers: The UC-V104BC ($135.00), the UC-V109BC ($149.00), the UC-V108BC is retailed for $295.00. You might be able to get better educational prices from Instructional Materials Equipment Distributors (IMED), 1520 Cotner Ave., Los Angeles, CA 90025-3003.

Videodisc players: A discplayer like the CD CDV LD player Pioneer CLD-V 2400 that can play videodiscs, audio CDs as well as CD videos is priced at $650.00. The Sony 1500 player is about the same price. I also have seen consumer videodisc players selling for $299.00 at Adrays.

Videodiscs and audio CDs: As for videodiscs and CDs, the prices vary. *Fantastique!* $195.00, *Three Men and a Baby* $29.00, *Salamandre* $75.00, and audio CD *Patricia Kaas* $19.95.

Distributors: Ztek Co, a hardware and software distributor of interactive videodiscs and CD-ROM for education, will mail their catalog if you write or call: Ztek Co, P.O. Box 1055, Louisville, KY 40201-1055, (800) 247-1603.

LA VIE provides videodiscs and barcode services. Write or call LA VIE, 5930 Plainview St., Ventura, CA 93003, (805) 650-9960, (800) 652-9960.

PICS distributes authentic foreign video on video cassettes and videodiscs. Write or call PICS, 270 International Center, The University of Iowa, Iowa City, IA 52242, (319) 335-2335.

PRESENTERS' BIODATA

Alice Slaton, Ph.D. (UCLA) Professor of French at Ventura College, has been a designer, producer, presenter, and author of multimedia language materials since 1984. She is the Coordinator of the LLAMA Consortium Project and the producer of several videodiscs and manuals: *Interactions Audio-Visuelles*, *Flash Télévisé*, and *Fantastique!*. She is designing instruction with barcodes to facilitate the use of videodiscs and compact discs for language students and teachers. She is now designing a multi-lingual CD-ROM.

Claire Saint-Léon, Licenciée-ès-lettres (Sorbonne), Ph.D. (UCLA), Professor of French at Tennessee Technological University, has been a member of CALICO since its inception and has been working with videodiscs since 1984.

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PRACTEST: A LANGUAGE PRACTICE AND TESTING PROGRAM

GARY SMITH

PRACTEST, a **Toolbook** application, was originally developed to alleviate an increasingly burdensome problem in the Language Learning Laboratory at the College of William and Mary. In third and fourth semester French classes, students must complete a dictation exercise as part of their assigned lab work for each chapter. Thus every second week, approximately 200 dictations were turned in and then corrected by lab assistants. Because the lab assistants specifically hired for that responsibility often could not free enough time from their other duties to complete the dictations promptly, the students generally got them back much later, long after they could connect the correction of their errors with the original audio stimulus. Further, the students' handwriting was sometimes indecipherable, and at times they simply gave up altogether when they could not understand the audio program. The frustration level of both students and lab assistants became critical. Often students would ask to see a transcript of the dictation after turning in their answer sheet, simply to find out what they had heard, and the lab assistants sometimes did their work rather perfunctorily due to lack of time.

Because 20 stations in the Language Learning Laboratory at the College of William and Mary contain an IBM-compatible computer as well as a Tandberg audiotape player, the obvious solution to this problem consisted of developing a program in which the students could type their dictations and check them on the computer, as they controlled the tape player manually. They would thereby receive immediate feedback on their errors, the lab assistants would be relieved of correcting the dictations, and the teachers would be able to read and analyze printouts of the results of the dictation exercises. The solution was clear, but the implementation was complicated.

The current version of **PRACTEST** incorporates the results of two years of experience with student use of an initial different program, and of a new program developed in response to observed weaknesses in the first one. Its functionality has been expanded beyond dictation exercises to include cloze exercises, multiple-choice quizzes, and restricted open answer items. It provides options for a number of languages and report formats, and it can be customized to fit either stand-alone or networked computer systems.

Instructors need only a basic knowledge of the **Windows** and **Toolbook** environment to be able to utilize the program. They create **PRACTEST** units by typing text into a **Toolbook** recordfield, and enclosing <answers> in pointed brackets. The exercise is then presented to students with only <> showing where they are to type in their answers. After filling in all the blanks, they click on the Check button, which initiates a simple word by word comparison of their answers with the correct ones in the (now hidden) recordfield. When the program encounters a mismatch, it highlights the word and asks the student to correct it. If the student enters an incorrect answer again, the program shows the correct answer, and requires the student to type it in before proceeding further.

To simplify entering characters with diacritical marks, the program provides a button bar from which the student can click on the desired character, then click in the field at the point where it is to be inserted. The instructor can customize this button bar for French, German, Italian, or Spanish by selecting the language on an options page. If the instructor selects English, the button bar disappears altogether.

The program displays to the student a running tally of the number of words immediately correct, and the number corrected on the first and second tries. Oddly enough, even though they see the correct answer before the second try, some students still type it wrong. Observation of such occurrences might be useful in diagnosing dyslexia or problems distinguishing between acute and grave accents, for example.

On the options page, the instructor can also choose among a number of report formats, from a basic report of the percentage immediately correct and correct after the first and second tries, to a full printout of the text with the initial student answers, to a printout of items answered incorrectly and the student's attempts to correct them. This also makes the program extremely useful as a diagnostic or research tool. In all cases, the report shows when the exercise was started, when checking was started, and when the exercise was finished.

Finally, the instructor can choose to have this information written to a single file for all students, or to individual files for each student. The former choice is appropriate for use on stand-alone computers, and the latter for networked computers where the records are written to a network drive.

Printing out these reports has proven to be a major undertaking, because they must first be imported individually into a word processing program. And if the program uses the ASCII character set, the characters must be translated from the ANSI character set used by **Windows** in order to print those with diacritical marks correctly. Fortunately, the macro capabilities in most word processing programs enable one to automate this procedure.

The program has proven to be extremely useful, from both the instructors' and the students' point of view. Students greatly appreciate the immediate feedback on where their comprehension of the audio program was incorrect, and they spend much more time on the exercise than they would if they simply wrote down what they think they hear. They also seem to take the dictation exercises much more seriously than before. The instructors appreciate the fact that they can easily evaluate their students' performance and individual problems, and receive the reports much earlier than before.

Since its introduction in the intermediate French classes, it has also been utilized for dictations in elementary Italian classes, and for grammar quizzes in intermediate German classes.

PRESENTER'S BIODATA

Gary Smith is an Associate Professor of German and Coordinator of Computer Assisted Instruction in the Department of Modern Languages and Literatures at The College of William and Mary, Williamsburg, Virginia.

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INTERNET: THE WORLD ON YOUR DESKTOP

LT. COL. RICHARD L. SUTHERLAND

ABSTRACT

Internet offers an opportunity to easily connect the desktop with the world. This presentation will describe the Foreign Language Internet Project (FLIP) at the United States Air Force Academy, where an "anonymous ftp site" is dedicated to storing foreign language documents for users worldwide to download free of charge. A demonstration will show how educators can connect with Internet, access the FLIP site, download news broadcasts along with weekly magazines, and use a standard word processor to generate instant electronic bibliographies. Other Internet sites will be accessed in Germany and Japan to show how easily educators can download authentic documents, thereby linking the desktop to world.

Internet has been described as "the world's largest information network..." (Gilster 1993). Moreover, the use of Internet has changed from the realm of "a few thousand computer scientists to access computers, share computer files, and send electronic mail..." to include an ever increasing number of "small colleges, small businesses, libraries, and high schools throughout the country...." (Gore 1992). Unfortunately, the foreign language community appears still to have made little use of this information resource. Although there are a few notable exceptions (e.g., the mailing list for members of the American Association of Teachers of German maintained by Dr. Reichelt), an investigation of most recent books on Internet reveals a paucity of resources available for language educators. Readers of this article are encouraged to evaluate this assertion by spending time at the Internet section of their local bookstores perusing the ever increasing number of texts on Internet.

Because of this L2 lacuna, the Foreign Language Internet Project (FLIP) was established at the United States Air Force Academy. The purpose of FLIP is to construct a prototype of an archive for L2 documents available free of charge to Internet users worldwide. Emphasis is placed on the term "prototype," for it would be ludicrous to assume that a single organization could become the repository for documents, graphics, and audio files of the world's languages. Nevertheless, a prototype is invaluable to clearly demonstrate the advantages of digital storage and retrieval of language materials.

One of the first lessons learned by FLIP was the inadequacy of e-mail as a medium for communicating in a foreign language because e-mail has no straightforward way of handling foreign language characters (e.g., even the extended ASCII character set). I am certain my fellow German linguists share the frustration of having all umlauts deleted from their messages to and from colleagues. Furthermore, replacing umlauts with "e" combinations (e.g., ae, oe, ue) produces documents that appear odd and are poorly suited as teaching materials.

In my opinion, the best solution to the "character" problem is to store and send files as "binary." A simple way to look at "binary" is to view the term as a description of those elements of a file that e-mail can't handle. A good example of "binary" elements is the formatting added by a word processor. The easiest way to store and send binary files over Internet is with the file transfer protocol (ftp), which is specifically designed to "move files from one computer to another. It doesn't matter where the two computers are located, how they are connected, or even whether or not they use the same operating system" (Krol 1993). Consequently, FLIP is an ftp site that allows users to upload and download binary files.

To download files, users must log on to the ftp site. Of course, logging on to FLIP assumes that users have a computer with a modem and an Internet account, which is available through most universities and even some high schools. (In Colorado, educators can obtain access to Internet for a nominal fee through the Colorado SuperNet.) Commonly used software packages for using a modem to connect with Internet (i.e., telecommunicating) are **Kermit** and **Procomm**.

The procedure for logging on to and downloading a file from the FLIP ftp site follows. It is important to note that ftp transfers files from remote sites on to a local mainframe or work station. An additional file transfer protocol (e.g., **Kermit, Zmodem**) is required to download files from the local mainframe/workstation to your hard drive. Although a discussion of this procedure goes beyond the scope of this paper, detailed instructions for this downloading have been developed by technicians at Datastorm Technologies and are located in the subdirectory software/ **Procomm**.

```
ftp ftp.usafa.af.mil
anonymous
rsutherl@csn.org  (Please use your login name)
cd language
cd german
cd center
binary
get dn11juni.txt
bye
```

- ftp ftp.usafa.af.mil: This line instructs Internet to do "ftp" and to connect with the ftp site at the United States Air Force Academy (usafa) of the Air Force (af) in the military (mil).
- anonymous: This word informs the ftp site that the user is "anonymous." Logically, ftp sites with this login procedure are called "anonymous ftp sites."
- rsutherl@csn.org: Please type in your login name. If you use my login name, the ftp site should not let you have access to the files.
- cd language: Changes the directory path to language (change directory to german, change directory to center.) It is simplest to only use small letters when doing ftp, because the ftp site is run by the operating system Unix, which differentiates upper and lower case.

One invaluable Unix command is "ls," the list command allowing you to list the files and subdirectories where you are located (i.e., "dir" for DOS users). Two other indispensable commands are "mget" and "prompt." The former can be viewed as "many get," and by typing "mget *" (i.e., similar to DOS's *.*), one can download all the files in a subdirectory. Setting "prompt off" enables these files to be downloaded without being prompted to answer yes or no about each file. Those interested in becoming familiar with Internet will invariably be forced into learning some Unix and ftp commands, which are included in introductory texts on Internet.

- binary: This informs the system that you are going to download a file that contains more coding than just an e-mail message. For example, you can download files generated by word processors like **WordPerfect** or Microsoft **Word** as well as files of graphics or digitized sound.
- get dn11juni.txt: This command gets the file "dn11juni.txt," the Deutschland-Nachrichten for 11 June as a **Word for DOS** document with umlauts rendered by "e" combinations. The file "930611.txt" contains the English version, again in **Word for DOS** format.
- bye: This command logs off of the FLIP ftp site.

The procedure for uploading a file is as follows. The only differences are the subdirectory incoming for incoming files and using "put" to put a file in the subdirectory instead of "get."

```
ftp ftp.usafa.af.mil
anonymous
rsutherl@csn.org  (Please use your login name)
cd language
cd incoming
binary
put yourfile.doc
bye
```

A second lesson surfaced by FLIP concerned searching files on one's hard drive for desired words or phrases. As I contacted different organizations to provide me with materials in German, I discovered that each invariably used a different word processor. SCOLA sent files done by the Macintosh in **Word 4**, (which I saved on to a DOS-formatted disc with the **Apple File Exchange** program for uploading onto the SCOLA subdirectory). Deutsche Welle preferred

WordPerfect 5.1. The German Information Center used **Word for DOS** or ASCII with "e" combinations for umlauts.

Fortunately, there is a solution to working with such disparate documents: the Find File command in **Word for Windows (Word)**. A powerful albeit undocumented aspect of the Find File feature is the capability to simultaneously search differently formatted documents. For example, users could download the files from the following FLIP German subdirectories: welle, scola, center. A topic currently of great interest in Germany is foreigners (i.e., Ausländer). Remarkably, all documents containing the word "Ausländer" can be identified by typing "Ausl nder" in the "Any Text" line of the **Word** Search dialog box. **Word** understands a space to be a Boolean/logical AND. Consequently, "Ausl ander" is considered to be the same as "Ausl&nder" in terms of search syntax, and the Find File command generates a list of all documents containing both "Ausl" and "nder," a list identifying all documents regardless of format containing the term "Ausländer" or even the term "Auslaender." Readers are encouraged to further investigate the possibilities of powerful word processors for accomplishing full-text searches.

The implications of such search capabilities for instruction are exhilarating, especially for those accustomed to working with the cumbersome faxes from SCOLA or the weekly newspapers from the German Information Center. Rather than an instructor painstakingly selecting appropriate segments from the aforementioned sources, students can now be tasked with generating such readings for the class, an effort greatly facilitated by the cut and paste capabilities of a word processor like **Word**.

Moreover, such authentic materials are excellent sources for student papers. SCOLA supplies daily news broadcasts. (Because SCOLA transcripts and translations are a commercial product, I have made available only a small portion of them to show how much easier it is to handle such documents electronically.) Publications from the German Information Center furnish the position of the German government. The subdirectory "welle" holds descriptions of the features produced over the years by German television (Deutsche Welle TV), an invaluable historical perspective. Hopefully, the full texts of these features will be available soon. These documents are just the tip of the iceberg of what can be made available with Internet for L2 learning.

The purpose of FLIP at the United States Air Force Academy is to produce a prototype for using Internet as a source for L2 materials; for connecting the desktops of L2 learners and educators to the world. The capability for binary file transfer of anonymous ftp archives overcomes the obstacle posed by foreign language characters and languages with non-Roman orthographies (e.g., Arabic, Chinese, Japanese). Word processors like **Word** contains powerful, if yet undocumented features, for expeditiously handling documents in different formats. These features underscore the advantages of storing data in digital format, especially when compared with faxes.

The hope and intent of FLIP is that other organizations with the mission of making L2 materials available will themselves establish anonymous ftp archives. In this respect, contacts have already been made with the Center for the Advancement of Language Learning, which has been tasked with setting up archives for less commonly taught languages.

For German materials, organizations that immediately come to mind are the American Association of Teachers of German (AATG), the Goethe Institute, Inter Nationes, the German Information Center, and Deutsche Welle TV. The AATG is already using a subdirectory to make documents available on standards and minorities. To assist the Goethe Institute, a subdirectory (Deutsch als Fremdsprache, daf) will be created to store the compressed files containing German foreign language materials, a database that expands into a 100 megabyte archive. Discussions have been conducted with Inter Nationes about transferring traditional slide/tape presentations into digital format and for producing interactive programs using these digitized files. A concrete example would be an electronic map of Germany's states that would allow students to "drag" the name of a state from a list to the appropriate location on a digitized map. As a step in this direction, the file for a map of Germany is under the subdirectory "nationes" (i.e., karte.pcx). The German Information Center has expressed a willingness to make its weekly bilingual newspaper and other official publications available digitally. An even greater contribution would be an ftp archive of these materials. Finally, discussions are underway with Deutsche Welle TV for access to the texts of its features — a priceless, historical archive of televised documentaries without the burden of expensive copyright considerations. Also, Deutsche Welle TV produces a weekly news broadcast in German, English, and Spanish. An archive of these transcripts would be a contribution nonpareil for the L2 profession.

SUMMARY

FLIP is a small step towards creation of a global network of information superhighways, a network that enhances yet transcends the "national network" advocated by then Senator Al Gore in 1992 (Gore 1992). An aspiration of FLIP is that other organizations tasked with providing L2 materials create similar electronic archives for enhancing L2 learning and communication with authentic materials freely accessible to the desktops of users worldwide.

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PRESENTER'S BIODATA

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CREATING YOUR OWN WINDOWS HELP FILES

CURTIS W. SWANSON

ABSTRACT

Windows users are familiar with the **Windows** Help facility that affords instantaneous access to searchable on-line information easier and faster than hard-to-use manuals. However, it is also possible to write your own Help files that include hypertext links, jumps, pop-ups, graphics and macros. With no programming involved, it is easy and quick to make customized **Windows** Help available to students for study and reference. Possible uses include on-line glossaries, dictionaries, grammar or style manuals, as well as edited readings complete with definitions, references, citations, and textual links. Minimal tools are required to get started: a word processor and the Microsoft **Help Compiler** (available at no charge). Although no programming is involved, several templates and macros are available as add-in packages to your word processor to facilitate production. Several such packages ranging in price from free to $495 are listed. Finally, possible directions of future **Windows** Help system development are suggested.

INTRODUCTION

Windows users are familiar with the Help files that accompany **Windows** applications and can be quickly accessed through the menu bar. Why page through bulky or hard-to-use manuals when information is available instantaneously on-line? Every Help file functions similarly and uses hypertext links, jumps, and hotspots (or pop-ups) to navigate quickly and efficiently to even the most obscure bit of needed information. Some applications include a tutorial to introduce the basic functions of the program. The Help file even provides instructions on how to use the Help system. Help files may contain not just words and text but also screen shots, scanned-in images, clip-art, graphics, and drawn objects.

HELP FILE FEATURES

Several navigation aids are provided in every Help file. To return to the previous topic, just click on the Back button. To display a list of the topics viewed, click on History. To display the complete glossary list, click on Glossary. Easily the most useful tool is the Search button that helps you find a topic by typing in a word or scrolling through a list.

Another feature common to all Help files is the ability to print a topic or copy information to other applications. In this way it is possible to create a subset of the manual for training or reference. Users may also individualize their help files by using the Annotate option to add their own notes and reminders to the help file. To read these notes, you simply click on the green paper clip. Another usability feature is the Bookmark option so that you can return to the marked section at another time.

ADVANTAGES OF MAKING YOUR OWN HELP FILES

The **Windows** Help System is such an integral part of **Windows** that users may not realize that they can produce their own Help files that share the general framework of the **Windows** Help interface while using their own data and information. Imagine that you are a teacher of literature and have assigned your students a paper on a poem. You ask your students to write the paper on a **Windows** word processor in the computer laboratory. You want to give the students copies of the poem and explain some of the vocabulary and the imagery used in the poem and give the students some background on the poet and the period. Instead of the usual handouts distributed in class, you tell your students to go to the computer lab and to load from within their word processor a special Help file you have created. This Help file, however, does not explain the functions of

the word processor but instead contains a complete unit on the poet and the poem. The students can access background information from the table of contents and can read the poem on-line. Difficult vocabulary items are explained not in the footnotes or in the margins but are highlighted by being underlined in green or by being shown in another color. When the student clicks on these words, a window pops up explaining the usage. Depending on the time you have spent in developing this project, the student may also click on topics that contain background information, pictures or sketches, bibliographies, selections from critical studies, etc. Students might also be able to access a list of literary terms with their definitions that is located in a separate Help file that is accessible from within the present one. If the students are expected to compose their paper in a foreign language, you may wish to make available another Help file that explains the vagaries of the foreign grammar with the same functionality and ease of use as the Help file that clarifies the mysteries of the word processor. While writing the paper, the student has been able to size and place the window in which these Help files appear at a convenient spot on the screen. The student may also copy portions of the Help file and paste them into the paper. When finished, the student prints out the paper to hand in and also prints out a copy of the poem and several selected topics for later reference.

The advantages to the students are clear to you. The students were able to focus on the task at hand because you had made all the tools that they would need accessible with but a few mouse clicks. Was the investment of your time justified by the return? You realize that you had invested only a modest amount of time. Since the poem and the supporting documentation were already in a file on your computer, all you had really done was to load them into your Microsoft **Word for Windows** word processor and adapt them with an easy-to-use Help authoring system that did not require any programming skills. You realize too that the Literary Terms Glossary Help file can be reused in future assignments just as you had reused the Grammar Help file. You decide to make a list of uses for the **Windows** Help file.

POSSIBLE APPLICATIONS

- Integrated reading/writing packages that supply texts and all necessary information.
- Tutorials (e.g., an "Introduction to the Resources of the Computer Laboratory").
- Glossaries (foreign vocabulary, technical terms).
- Visual dictionaries.
- Grammar and style manuals.
- Bibliographies.
- Database navigation tool.
- Help files for your own software programs written in Visual Basic/Turbo Pascal.
- Electronic book.
- Electronic magazine/newsletter.
- Multimedia authoring.

SOFTWARE TOOLS REQUIRED

The minimum software toolset required to produce a Help file consists of a high-end word processor (such as Microsoft **Word for Windows**) that can produce rich text format (RTF) files and the Microsoft **Help Compiler**. (The latest version of the Microsoft **Help Compiler** may be downloaded at no charge from the Microsoft Software Library: (206) 936-6735).

The Help author does not need to have any programming experience. Help is created in any word processor that can generate RTF files. Since there is no programming language to learn, creating the Help system is not unlike creating a text file in a word processor. Most of the editing tools of the word processor are also applicable in the Help document. The primary difference lies in a variety of control codes that are added to the document to indicate keywords, browse sequences, jumps, hotwords, and so forth. These special symbols (actually keyboard symbols such as + # $ *) are instructions to the Help compiler. Through compiling, the symbols are replaced with the desired function. The compiler generates a single file with the HLP-extension that is loaded into the **Windows** Help engine WINHELP.EXE provided with the **Windows** environment.

Adding the control codes manually is not a difficult task nor one that requires programming skills. It is, however, laborious and exacting work that is therefore prone to mechanical or typing errors. Fortunately, a number of automated tools are available to reduce the tedium, to eliminate entry errors, and most importantly, to accelerate the authoring

process. Many of these tools consist of a set of templates and macros that are recognized by the word processor. Even those Help file developers who have considerable programming experience and access to the manuals of the Microsoft **Software Development Kit (SDK)** prefer to use one of these readily available programming environments. These programs are available commercially or as shareware and range in price from being free to $495.

COMMERCIAL PROGRAMS

Doc-To-Help
($295; requires Microsoft **Word for Windows**)
WexTech Systems, Inc.
310 Madison Avenue, Suite 905
New York, NY 10017
Phone: (212) 949-9595

Help Magician
($199; does not require Microsoft **Word for Windows**)
Software Interphase, Inc.
82 Cucumber Hill Rd.
Suite 105
Foster, RI 02825-1212
Phone: (401) 397-2340

Robohelp
($495; requires Microsoft **Word for Windows**)
Blue Sky Software Corporation
7486 La Jolla Blvd., Suite 3
La Jolla, CA 92037
Phone: (619) 459-6365

SHAREWARE PROGRAMS

Help.Dot
($15; requires Microsoft **Word for Windows**)
L. E. Brown
120 Deer Trail Drive
Sedona, AZ 86336

HelpMaker
(Free; requires Lotus **Ami Pro**)
Cris Williams (CompuServe 75300, 2704)

WinHelp+
($25; requires Microsoft **Word for Windows**)
Stedy Software & Systems
781 Beech Street, #1
Manchester, NH 03104-3671
Phone: (603) 626-6034

Visual Help
($49; does not require Microsoft **Word** for **Windows**; until purchased, the shareware product has only limited functionality).
WinWare
P. O. Box 2923
Mission Viejo, CA 92690
Phone: (713) 524-6394

INFORMATION SOURCES FOR CREATING HELP FILES

There are several sources of programs and information that can be obtained via CompuServe. For example, the Microsoft SDK Forum on CompuServe offers many files that relate to Help file authoring in the WinHelp library. The extensive Microsoft **Windows** Help Authoring Guide is available there as well. In the Microsoft **Windows** Shareware Forum all of the here-listed shareware Help authoring systems are accessible for downloading. If you decide to use such a shareware program after downloading and experimenting with it, you are expected to pay for it. Prices are usually low, ranging from $15 to $50. Although the commercially available programs are much more expensive, they often contain a richer set of features, a manual, tutorials, and offer technical support. The resulting Help file may be no better than one produced using a shareware product; however, the investment of time and frustration may be much less.

A further source of information is the book with accompanying diskette: *Developing Online Help for Windows* by Scott Boggan, David Farkas, and Joe Welinske (1993). This book discusses design issues and development methodology. This book is indispensable for anyone with more than a casual interest in authoring Help files. The diskette includes a serviceable **Word for Windows** template and other utilities that may be all you need to develop your own Help files.

THE EVOLUTION OF HELP SYSTEMS

The **Windows** Help system is a basic, serviceable tool for providing on-line information. As useful as it is, however, the more one works with it, the more its shortcomings become evident. Even the basic interface tools provided by Help need to be improved. For example, keyword searches are an important function that the Help system provides, but they need to be expanded to allow for global, fuzzy, and

boolean searches. Although Help represents a welcome application of hypertext linking theory, one longs for a more sophisticated implementation. The weakness of support for today's multimedia computers is apparent. Although it is possible to address some of the multimedia capabilities such as sound, there is no satisfactory way of incorporating video, animation CD-ROM (or other peripherals).

Finally, there is little or no interactivity. Although the user can "drill down" to the desired information, the Help system cannot process any information input by the user. Some recent computer applications have begun to use Wizards and Cue Cards that solicit information from the user and can thus provide more focused user support. Perhaps a future version of **Windows** Help will break the bonds of being an "on-line manual" and evolve into a more sophisticated tool.

PRESENTER'S BIODATA

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MAKING THE BEGINNER'S WORK MEANINGFUL: NEW TOOLS FOR REPORT GENERATING AND DATA ANALYSIS

FINLEY M. TAYLOR

At CALICO '93, I reported on the deficient reporting and data gathering mechanisms of some software for beginning language texts. This presentation looks at some of the tools we developed for improved reports and for examining data gathered by record keeping **CALIS**. We have seen that these programs enable the teachers to help students develop more effective learning strategies. Furthermore, they encourage teachers and students to spend more time in the media center because computer assignments have become more meaningful.

The major stumbling block slowing meaningful use of the ancillary software accompanying beginning language texts, in my experience, is that the software packages either provide no reports or that the reports are difficult to generate and even more difficult to comprehend. Of the software surveyed in a report at CALICO '93, I stated that only **CALIS** captures significant amounts of data, but that this data remains in raw form. At our institution we have changed this situation by focusing our limited resources to enhance the interface between computers, teachers, and students; and we produced software reports tailored to the Spanish, French, and German instructors' needs. This presentation looks at those efforts and their effects.

A couple of general observations about our beginning language instruction. All first and second semester Spanish, French, and German classes regularly attend our new Language Media Center (LMC) for instruction. The modern Sony Language Learning Center (the LLC9000) and 30 computer stations, is both a teaching facility and, as scheduling permits, an open PC and audio lab. It is not uncommon to find a class using the Sony lab while students and faculty are working independently on the computers. Having teachers take, rather than send, students to the LMC reflects an attempt to avoid certain perceived "problems" with the language labs of the 60s – 80s. We feel that instructors must be involved in media activities for the work to be meaningful, and we feel that the students must see the rewards for working there.

The instructors use the Sony lab for oral drills and testing; and, as a minimum, they introduce the students to the computers and the software used since these languages require computer homework. Not everyone was happy with our new "lab requirement"; reactions varied from nervous anticipation to grudging acceptance. Gradually, most instructors have warmed to the LMC, as they have learned how to use technology to enhance teaching.

While the greater aim has been to make teachers independent and confident users of our equipment, the LMC staff has played a crucial role in the acceptance of this new technology. The staff consists of undergraduate students, sometimes adjuncts, and, most recently, two graduate computer science students. Above and beyond housekeeping duties, they ensure the Center's smooth operation by providing faculty and students with assistance on everything from basic DOS commands and network functions through specific language software help to advice on the more complicated Sony lab functions.

The two computer science students have greatly advanced our cause. As our department's use of computers outgrew computer services' abilities to meet our needs, it became necessary for us to do more for ourselves. Operating within a very restricted budget, we turned to advanced computer students, at first, to run the network, generate accounts, and coax third-party software to run. We soon realized that they would play an indispensable role if we intended to make serious use of the possibilities offered by the available software. Their

chief function this past semester turned out to be the development of reporting software for the various software packages. At first, the goal was to supply instructors with accurate reports on exercise results for grading. The reports, however, often gave unnecessary and/or repetitive information and were confusing. We modified the reports to make them clearer. Additionally, some teachers realized that the stored data offered a potential view into the individual student's learning processes.

THE SPANISH SOFTWARE

Spanish instructors are required to submit lesson plans for lab activities. They have recently changed textbooks, from *Ya Comprendo* to *¡Arriba!*. Both textbooks are published by Prentice Hall, and both use software (**MACAIS** and **PHTUTS**) by Ewing Systems. The software offers attractive drill and reading comprehension exercises. The user can usually vary level of difficulty by choosing the type of exercise; for example, from true-false through multiple choice and pick-and-type to fill-in-the-blank. As each student works at the computer, the software records student name and I.D. number; chapters, sections, activities, and modes; scores for each activity; time spent at the computer; and date. The software developer's intent was that each teacher must gather data files from individual student diskettes for comprehensive class reports, but we found that few instructors had time or even knew how to do this. We facilitated software distribution by putting it on the network, where, incidentally, all students records are kept in one large encrypted file.

Although students liked the software, faculty were slow to appreciate its worth. We felt that the usage would improve if we could get the teachers to work with the students and the software, and require further student use for homework. However, this would only happen if we could produce regular, reliable reports. But who would produce such reports and how? In spite of repeated contacts with Prentice Hall and Ewing Systems, we were unable to get the report generating programs to work reliably; and, when we did get reports, we found them to be shamefully wasteful of paper as well as practically unusable because the data presented was too comprehensive, repetitive, and confusing.

Using **Turbo-C**, we developed several varieties of report-generating software to allow the instructor to retrieve information from the **MACAIS** and **PHTUTS** programs. The reports actually requested follow:

- Report of multiple activities by all students in a class. The user is prompted to specify class, chapter, type of activity, and the specific exercise. Some 80% of the instructors preferred this form and asked to get the reports as each chapter was completed.
- Report of all activities by all students in a class. The report is cumulative; however, only the highest score is reported for any particular exercise, regardless of the number of times a student may have repeated the exercise. Some 20% of instructors asked for this type report, at the end of the semester.
- Report of all activities done by any particular student in any given class. All activities reported. This report was requested only a few times, when students maintained that they had done unreported work. It usually turned out that the students had incorrectly entered information into the database.

It turned out that only a few instructors (ca. 20 %) required little more than confirmation that the students had spent a certain amount of time doing exercises. Most opted for a report on highest scores of selected activities by chapter, reflecting carefully planned computer homework requirements. These teachers also wanted to know the date a particular activity was completed. We also reported how long it took the student to complete the exercises; however teachers showed little or no interest in this information. In our attempt to involve the instructor as fully as possible in the program, we intended for each Spanish instructor to generate his or her own reports; however, finding that many were not yet ready to assume this task, we settled for having them work with the LMC staff and select which type of report they preferred.

FRENCH TROUBLESHOOTERS

For the French, we purchased updated software, but developed our own report generating software to the instructors's specifications.

This software was first used with French courses at UCF when the French instructors adopted D. C. Heath's *Rapports*. The software was **The French TroubleShooter (FTSH)** by Jay Bodine.

The French instructors found the software to be so useful for their students and so integral to their teaching goals that they began requiring their students to complete specific **FTSH** exercises as regular homework assignments. **FTSH** did not provide

record keeping; and the inventive attempts to supply proof of completed homework inconvenienced all parties. An important consideration in using the **FTSH** software was that it allowed the teachers to easily change the exercises (ASCII text files) and/or create tests, using the same instrument, i.e. the computer, which the students used for homework.

Although Jay Bodine, the developer, brought out a newer, record keeping version (**FTS**), D. C. Heath did not make it available with the third edition of *Rapports*. However, our French instructors pressed, and we bought the improved software.

The new **FTS** offers several improvements, including more attractive color screens. Easier directions for forming French characters and other minor screen design features improve the user interface. What we find most useful, however, is the fact that it keeps records of the students' performance, as well as offering students the opportunity to record comments for the instructor.

The only thing the teachers didn't like about the new software were the reports. The information was not sorted according to instructors' needs, and unnecessary and repetitive information obfuscated the reports. While some of the teachers were willing to edit their reports, they were happy when we offered to help. **FTS** stores all scoring data in one file; it keeps student comments in a separate file. We developed menu-driven software, which allows the teacher to stipulate class section and choose a cumulative or chapter report with all scores or only the highest for each exercise. The result, sorted by class and student, then gives the number of correct and total possible answers, the score, date score, and time required to complete each exercise. Another option allows the teacher to examine the contents of the comments file.

The most important element in the development of these reports has been the close cooperation of the French instructors with the software developer. As the teacher gained insights into what was possible, the process allowed easy modification; the result was information in the most comprehensible format. The French instructors run the software to produce their reports and only occasionally require minor assistance.

While some of the instructors only wanted timely reports on exercises and scores, there was noticeable interest in using the reports to gain information about individual student performance. For example, a comprehensive chapter report quickly shows which students merely fulfilled an assignment by accepting the first passing score and which students repeated exercises to improve performance. And at least one instructor perused the data to compare students' performances; if a student consistently took longer than others to complete exercises, the teacher worked to discover the reason. We have not yet been asked to modify the software to flag students potentially in need of help, but this seems an obvious development. Especially so, since the same teachers are already using the data on the Sony LLC9000 analyzer.

CALIS REPORTS

Records keeping **CALIS** stores data in paired files. One of these files contains the exercise name and score made by any one student during any given work session; a second file contains every answer produced by that student in that session. There is report generating software, which must be run periodically by a system administrator. An initial process collates data from the paired-files, which will later be deleted into new files in separate directories. Then reports are printed, giving only the highest score for each exercise regardless of when completed; these reports are a model of clarity. The teacher is not involved in this process, and there is no practical way to get immediate results from exercises or tests or to identify and examine students' actual answers.

Our first efforts to analyze test data resulted in a C-program, which could only be executed after the original **CALIS** report had been run; i.e. the system administrator was involved. In our next attempt, we worked directly with the still unprocessed paired-files, using **FoxPro**. Although praised as user-friendly among those familiar with databases, **FoxPro**, and command files which require it, are too complicated for the casual use of our instructors. Furthermore, as a skilled user advised, **FoxPro** is not suited for scanning ASCII data files. We eventually selected **Perl**, an interpreted language designed to scan and extract information from arbitrary text files. **Perl** is simpler to use than **FoxPro** and can be managed by instructors with little training. We use it with **FTS** and **CALIS** data files.

For **CALIS**, we have developed two tools. One produces reports similar to those for **FTS**; however, they allow even greater flexibility. Using menus, the instructor can choose class or individual reports for any particular exercise or test; a further option will show the answers. The results can be captured and printed.

The second **CALIS** tool addresses the larger body of already sorted answers, namely those in the **CALIS**/CAPTURE subdirectory, where answers are stored in individual files by exercise. Little, if any, use has been made of this data. Our program sorts and counts the answers, and lists them in decreasing order of frequency. There are options to ignore irrelevant data, such as PASSON and PASSBACK (records of the exercise option to skip over or return to a question) or end punctuation. Furthermore, one can ask to see answers which occur more than any specified number of times.

The German **CALIS** exercises were our first and, for a while, our most popular foreign language software. That changed, primarily because of a textbook change; an important secondary consideration was that the **CALIS** program was maintained by an administrator and the faculty. Though enthusiastic about the exercises, remained otherwise uninvolved. The new reporting programs were developed to address the latter concern and, hopefully, generate interest among the faculty for scripting new **CALIS** exercises. At the time of this writing, it is too early to report on their success. In any case, we have preserved data from several semesters of students using **CALIS** in beginning German courses; when analyzed with this new tool, this data should yield useful insights.

CONCLUSION

We have seen a dramatic increase in the use of computer software in Spanish and French in the last two years, and especially in the last year. Certainly this is in large measure due to the fact that both faculties were convinced that the students like to work with the computer programs. A significant portion of these instructors appreciated the students' interest and acted resolutely to get the needed reports on student activities; they also prevailed on other colleagues to encourage the use of the software.

But we must also note that there were other factors. Crucial to the success of the computer technology is the fact that our teachers come to the Media Center to use the Sony lab. Since the computers are at hand and the students want to use them, it was only natural for the teachers to spend increasing amounts of time with their students at the computers.

It is also important to note that the equipment is in a Language Media Center, and the faculty have come to feel that it is their Center. Our helpful staff played an invaluable role in this acclimatization; our graduate computer students were decisive in getting the necessary reports. The teachers are becoming confident users who demand ever more of the audio and video technology, as well as the computers.

It is interesting to note that, as computer usage has grown, the assignments have become more specific and more meaningful. I believe the day is at hand when our faculty will begin using the Sony analyzer not just for testing but to analyze the teaching and testing instruments. They will ask us for computer reports which will do the same, programs which will also identify particular exercises and or questions for review or further clarification, as well as identify students who need help.

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LOST IN HYPERSPACE: SOLUTIONS TO NAVIGATIONAL PROBLEMS IN HYPERTEXT

THOMAS F. THIBEAULT AND SANDRA ADAMS

ABSTRACT

Text materials, which were once found exclusively in a static, linear format, such as books and journals, are now often presented in a new dynamic format known as hypertext. Hypertext is a computerized, non-linear, non-sequential presentation of text-based information. It allows students to learn through exploration and association with minimal input from the instructor. A hypertext document allows users to click on a word or button to access glossaries, maps, graphics, charts, motion video clips or additional information about any unfamiliar concept. All the elements and links that make up a particular hypertext unit can be referred to as "hyperspace." The potential hazard in this approach is the danger of getting lost in hyperspace because it is sometimes difficult to retrace the path to the point of origin due to the number of paths, the lack of a beginning or end and the nebulous specifications of direction and pedagogical approach. This paper suggests several effective navigational strategies for hypertext developers and gives examples of approaches used in commercially produced materials.

INTRODUCTION

Technology has given us mortals amazing powers and abilities only dreamed of a century ago. We can fly above the clouds at a thousand miles per hour, see the inside of a beating heart and communicate in real time with friends on the other side of the world. In some cases, technology has created a dilemma never encountered before in the history of the world. It has not only increased our capacities tremendously but in some cases can tax us beyond our physical and cognitive limits. For example, fighter jets are capable of g-forces that exceed the physical limits of their pilots, causing the pilots to black out when it is most inconvenient to do so. On the cognitive level, we are frequently hit with information overload where we are fed information faster than we can process it. I remember being very excited about all the fascinating electronic lists I could subscribe to on the Internet once I became aware that such fountains of information existed. However, I did not anticipate receiving over three hundred new entries to digest every day. I eventually did a lot of unsubscribing because the task of processing all that information was simply too time-consuming and overwhelming. As educators, we are also challenged by a flood of new instructional materials and methodologies which defy principles of traditional instruction. Text materials, which were once found exclusively in a static, linear format (books, journals, etc.) are now often presented in a dynamic, non-linear format known as hypertext. **Hypertext** can be defined as a "non-linear, non-sequential presentation of text-based information by computer. Based on the theory that the human memory operates by association, hypertext technology allows individuals to access information in the same way, associatively, or fact-to-fact, rather than in a predetermined linear structure found in traditional databases and paper documents" (Retterer 1991).

Examples of this approach in the area of reading are the *Discis* series, Voyager's *Expanded Books* series, Transparent Language's *Foreign Language Readers*, and the Goethe Institute's interactive video business German package, *Eine Reklamation*. Other instructional materials make use of various media tied together by context. Hypertext is also used extensively in databases. A magnificent example of this innovation is **Perseus**, a hypermedia database of Greek antiquity. This database combines digitized photos, drawings, motion video and hypertext to explore a broad spectrum of ancient Greek literature, history, architecture and art. Students can browse through the material without any specific direction or they can follow various paths dealing with a specific concept. In these examples, technology allows students to learn through exploration with minimal input from the instructor (Carr 1988). As a result, the role of the teacher changes from that of "disseminator of information" to "facilitator of learning."

PITFALLS IN HYPERSPACE

Hypertext allows content-based access to information. For example, users can click on a word or button to access glossaries, maps, graphics, charts, motion video clips or additional information about an unfamiliar concept. All the elements and links that make up a particular hypertext unit can be referred to as "hyperspace." The potential hazard in this approach is the danger of getting lost in hyperspace (Jonassen 1991; Jonassen 1988). It is sometimes difficult to retrace the path to the point of origin because there are so many choices. Another cause of disorientation is the lack of a concept of quantity or scope (Marchionini 1988). Static media such as books have a fixed quantity of pages that are accessed in a linear manner. Here, the reader can estimate how long it will take to peruse the material. With hypertext, there is no beginning, end or quantifiable structure and thus its non-linear format defies the concepts of fixed quantity or scope. These problems can have an adverse effect on motivation and effectiveness. If students feel they are just going around in circles, it will be hard to sell them on the idea of hypertext as a more efficient and motivational way to learn. Instructors should never put hypertext materials into the hands of their students without proper orientation and guidance, especially during their initial exposure.

Because of the highly interactive nature of hypertext materials, specific instructional approaches are generally not clearly defined and the dangers are compounded by the fact that navigation paths in hyperspace are not always clearly defined (Borsook and Higginbotham-Wheat 1991). Figure 1 shows the nodes and links of a hyperspace environment. There are no arrows indicating flow since the flow moves according to the desire of the user wherever a link exists.

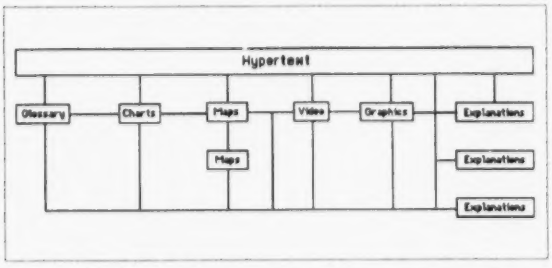

Figure 1. Simplified Hyperspace Environment

Vandergrift (1988) describes the hyperspace environment as an "amoeba-like form which, moves, grows, and changes as users interact with it." The non-linear nature of hypertext allows motion in all directions, horizontally as well as vertically. The danger of disorientation increases exponentially as the number of links and nodes increases. It is quite easy to lose your way and even forget where you started. In hypertext there is simply no pre-defined path to follow and no right or wrong way to proceed.

NAVIGATIONAL STRATEGIES

Of primary importance is simplicity in traversal. Kearsley states, "Navigation should be simple, intuitive, and consistent throughout the system. Movement through the system should be effortless and not require thought" (1988). There are several features and functions that can be built into hypertext materials to alleviate the unique navigational problems found in that environment. The following suggestions do not represent different independent solutions, but rather strategies that can be mixed and matched depending on the needs and preferences of the developer.

Dynamic Maps

Probably the most effective solution to navigation in hyperspace is the dynamic map (Raker 1989). This is the hypertext equivalent to the classic "You are here" sign found in many parks and malls. The map can also be used to provide a general overview of the hyperspace environment as a form of advance organizer. The map consists of a visual conceptualization of all the links and nodes and the user's current location is highlighted. It can also trace the user's path; for example, by highlighting the paths covered (see Figure 2). Since the map is dynamic, users can instantly transport themselves to any location in hyperspace by clicking on the corresponding node on the map and thus bypass all paths. **HyperCard**'s "go recent" function performs a similar task. Users see miniature representations of all the cards they have accessed. Clicking on any miniature card transports them immediately to the actual card. A dynamic map can be accessed by selecting a menu option or clicking a button on a given screen. This option should be available on all screens within the hyperspace environment.

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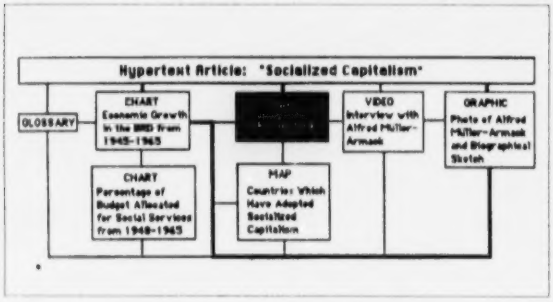

Figure 2. Simplified Dynamic Map

Buttons, Menu Bars, and Palettes

Since ease of navigation is a prime consideration in hypertext, it is essential that all navigational features and functions be clearly marked and predictably placed on the screen. A portion of the screen should be boxed off or a separate menu bar option should be reserved for navigational purposes. Due to different pedagogical demands regarding screen design, it may be necessary to place navigational buttons in different locations, depending on the type of activity. This may lead to an unnecessary compromise regarding ease of location and access. Another alternative is the use of palettes. Palettes function as objects independent of the active window. They reside on top of all other objects on the screen so they are never hidden from view. They can be moved around on the screen if they happen to appear in an inconvenient location. If palettes are too large, they will almost always be in an inconvenient location. This is especially true of hypertext which generally uses the majority of the screen for text. In any case, palettes can be easily hidden with a click of the mouse and then recalled when needed. A navigational palette would contain all the buttons necessary for maneuvering in hyperspace (see Figure 3).

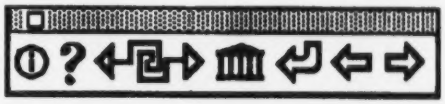

*Figure 3. Navigation Palette from **Perseus***

Limiting Link Options

Hyperspace does not necessarily mean that all paths are open at all locations within hyperspace. At times it may be appropriate to block off paths that are irrelevant. Doing so may help the student focus on essentials and prevent cognitive overload. Reducing the number of branching options is an acceptable strategy as long as it does not defeat the purpose of hypertext. The more the linking options are limited, the closer the material comes to being nothing more than traditional, static, linear text.

Color Coding and Partitioning

Some developers may prefer to use the menu bar option for navigation functions. This tends to be slower and clumsier and the navigation option may not be readily recognizable to the novice, even though the header clearly says "Navigation." Students who are unfamiliar with hypertext may not recognize the important role that navigation plays in this environment (Harris and Cady 1988). The menu bar option is possibly the least desirable option because an essential function is hidden until called upon. This is acceptable for less important features, but not for navigation in hyperspace. In order to maximize visual orientation regarding navigation functions, hypertext developers should use brighter colors for the navigation buttons or background. If colors are not available, patterns can be used to draw attention to the navigation features.

A portion of the screen can be partitioned off as an exclusive location for navigation functions. These functions should be in the same location of every screen whenever possible in order to avoid disorientation.

Window Layering

Each location within hyperspace appears on the screen within a window. The window may take up the entire computer screen allowing the user to view only one window at a time. However, it is possible to make the windows small enough so that several windows can be seen on the screen at the same time. **Transparent Language** allows users to hide windows that they feel are irrelevant in order to prevent excess information from becoming a distraction. **Perseus** has windows of different sizes, some of which can be moved in case they obscure other information. The advantage of multiple windows is that the users can still see where they were previously. When only a single window is visible, it is much easier to become disoriented. On the other hand, an excess of windows visible at the same time could also have a disorienting effect.

Intelligent Tracking

In a free-path hyperspace environment where there are no restrictions on movement or direction, intelligent tracking may serve a useful purpose. This type of tracking is called "intelligent" because it generates feedback based on the users' performance. Each activity in the hyperspace environment is coded by time, entry point and exit point. For example, the time code keeps track of the amount of time a user spends at a particular location in hyperspace. If the computer determines that an excessive amount of time has been spent at one location, it asks the user if everything is all right. If not, it asks questions about the user's next desired course of action. It can also make suggestions for further exploration such as is found in computerized encyclopedias. In addition, the computer keeps track of the paths taken. It can remember where the user was before entering a given location as well as where the user went from that location. It can then make a judgement as to whether the user's path is a logical and efficient one and provide appropriate feedback.

NAVIGATION IN COMMERCIALLY PRODUCED HYPERTEXT MATERIALS

The following is not intended to be a detailed description of some commercially produced hypertext materials, but rather a brief description of their navigational features.

Perseus is a very complex multilayered hypermedia database. The major navigation tools are found on a floating palette that can be moved around and "clicked" away at will. Other links are available through a static menu called the "Perseus Gateway" as well as on a pull down menu called "Links" found on the menu bar. Most windows can be moved around or hidden to expose obscured portions of the screen. It is possible to have several windows on the screen at the same time. This can be confusing at times, but in most cases the windows can also be "clicked" away to reduce the level of distraction. One unique feature of **Perseus** is a path card which can contain pre-defined paths for "guided tours." These paths can be altered at any time by the user. If users get lost, they can click on the left arrow of the Path icon to return to the previous location. They can also choose a feature called the "Current Path Card" option. This card shows a layout of the path similar to the concept of the dynamic map. The user can select any location on the layout, see its corresponding description, and go directly to the path location.

From Alice to Ocean is an innovative hypermedia program on CD-ROM based on the book by Robyn Davidson. It chronicles her treacherous journey from Alice Springs, Australia to the western coast. It combines, digitized photographs, **QuickTime** movies, graphics and text to create a fascinating hyperspace environment for exploration. The major navigation features are contained in a static window that can be accessed at any time by pressing the SHIFT key. Sidebars on the navigation window allow the user to jump to subsections such as photo tips and cultural tidbits. This particular program actually allows navigation in the usual sense. Users can select any one of six journey segments visible on a global map showing the western part of Australia. By clicking on a particular portion of the map, the user is transported immediately to that location and is given the option of selecting a more specific location within that region. Within each region and section there are other links which deal specifically with that area. Some of the navigation buttons actually consist of miniature photographs representative of the topic. Because of consistency in partitioning the screen and in designing the navigation buttons, traversal is always easy and intuitive.

The Great Quake of '89 is a hypermedia database which combines text-based information, graphics and video segments on laserdisc to cover the great catastrophe of 1989. It uses the partitioning approach and combines a static icon bar at the bottom of the screen with a floating palette for laserdisc controls. The dialog for most video segments appears in a dynamic window on the computer screen. Icons indicating accessible video segments appear on the left portion of the main screen. Since the linking options are represented graphically with icons and predictably placed on the screen, navigation with this hypermedia program is very easy and intuitive.

Salamandre is a hypermedia database on videodisc about the chateaux of the Loire Valley in France. Various options allow the user to fly over the grounds, tour the chëteaux and access information about their history. Subject and art indexes are available for perusing various topics. For example, if you are interested in kitchens within the various chateaux, you can select that topic and the computer will generate a slide show using all relevant frames on the laser disc. All information can be accessed by geography, subject or chronology. Texts contain "hot words" in bold print which can be clicked to access another text or an appropriate image on the videodisc. *Salamandre* uses partitioning and fixed icons or buttons for navigation (see Figure 4). In general, laserdisc controls are partitioned off on the

lower part of the screen, all sub-nodes relevant to a particular node (*chëteau*) are located on the left side of the screen and major jumps to indexes or other chëteaux are found at the bottom of the screen.

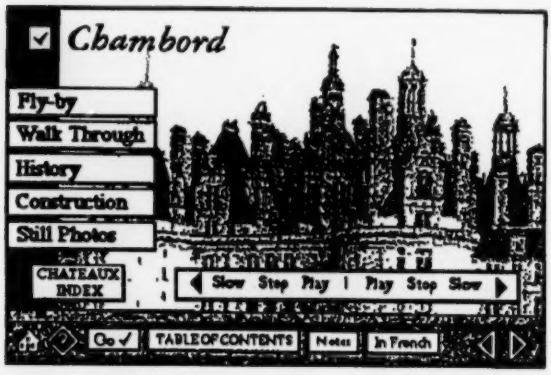

Figure 4. Navigation Screen From ***Salamandre***

CONCLUSION

Hypertext materials offer the potential of enhancing the learning experience tremendously through the excitement of exploration, intuition and independent thinking. Through this approach, students have the potential of mastering higher levels of cognitive processing and increasing their thirst for knowledge. However, the technical challenges that this new concept presents can serve as an obstacle to widespread appreciation and adoption. Educators and developers working in hyperspace should consciously address the unique challenges in this environment. Free navigation is only one of those challenges, but it is of prime consideration since it is not only a means of maneuvering through hyperspace, it is also the core of hyperspace.

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DEVELOPING PROCESS-ORIENTED LISTENING AND READING COURSEWARE WITHOUT ANY PROGRAMMING SKILLS: L & R TEMPLATE FOR FOREIGN LANGUAGE PROFESSIONALS

JON V. VAROSH AND JOHN LETT

INTRODUCTION

The **L & R Book** Template System can currently function in 20 foreign languages and is made of two interrelated templates: the Teacher's Developer Template (Teacher's Book) and the Student's Viewer Template (**L & R Book**). The **L & R Book** allows teachers to create their own CALL listening and/or reading materials without programming skills, putting their expertise into the teaching process. The template design follows principles from language processing theory; the foreign language learner is guided through the steps of schema building, top-down processing, bottom-up processing, and skill integration. With the exception of these steps that are built into the design, the **L & R Book** Template is a delivery system that does not force the teacher into a preprogrammed "multiple choice" or "fill-in" type exercises, but allows the freedom to create foreign language learning activities that focus on developing foreign language processing skills.

TECHNICAL SPECIFICATIONS

The source code of the **L & R Book** Templates is written in Multimedia **Toolbook 1.53** openscript, and requires an IBM compatible 386/33 MHz or better PC with a Pro-Audio Spectrum Plus or Sound Blaster compatible sound board, a 3½" floppy drive and a minimum of 8 MB available disk space on the system's hard disk (Drive-C), and a headset and a microphone combination or an external speaker system and a microphone. The system must be running in **Windows** 3.1 and **DOS** 5.0 operating systems.

L & R BOOK TEMPLATE AND HUMAN FACTORS

Functional Objectives

- Enable teachers to stay in their field of expertise, namely teaching, and to develop CALL courseware without programming skills.
- Use the computer as a delivery system for authentic materials with teacher-developed activities that reinforce the foreign language learning process.
- Provide a nonthreatening, learner-focused medium for the adult language learner by providing the teacher with the tools to design activities that are process-oriented.

User-Level Perspective

For the **L & R Book** developer template-

- The developer has complete control of text selection, choice of language used, and activities designed in the framework of schema building, top-down processing, bottom-up processing, and follow-up tasks.

For the **L & R Book** viewer template-

- Students select an activity based on topic, skill area to be practiced, and proficiency level, all of which is contained in the information card.
- Students can choose either the target language or English in responding to the activities on the electronic notepads.
- Students can access the variety of HELP functions at any time.
- Students can do the activities in the sequence they prefer.
- Students can choose follow-up activities according to their preference (if this option is provided by developer).

- Students can practice their pronunciation with the "Record and Listen" feature.
- Students can work on translation and transcription skills (DLI application).

Screen Design

- A separate screen page is designed for each function group, e.g., Schema-building, Recording, Student help, etc.
- At each screen page, type, size, and number of data fields are determined by the operational needs for that function.
- On each screen, background, windows, caption bars, and buttons are coded in standard colors.
- Screen appearance is dictated by principles of functionality, simplicity, and standardization.
- Optimization of usable screen space is maintained by considering the sequence of events at each function.

Human-Computer Interaction

- Throughout the L & R Template(s), the user is guided by a standard navigational device for the next suggested step.
- In communications with the user, plain language is used to provide human-computer interface as required.
- Instead of multiple-menu and sub-menu options, standard buttons are used in all activities and functions.

LISTENING & READING BOOK (STUDENT'S VIEWER TEMPLATE)

Student work stations or lab computers contain only the **L & R Book** Viewer Template. Students may select and run a particular **L & R Book**, either from a floppy disk library, from the System Storage on the C-drive, or from a CD. At the opening screen (Figure 1), the only active button is the "Select a New Book" button. This button brings up the menu of L & R Books on the storage device. Before selecting a L & R Book, students may review its specifications on a Summary Information Card. At this screen, they also obtain operational instructions in audio and video modes.

During the downloading process, operation buttons for activities are activated, and a small yellow arrow guides the user to the first activity group.

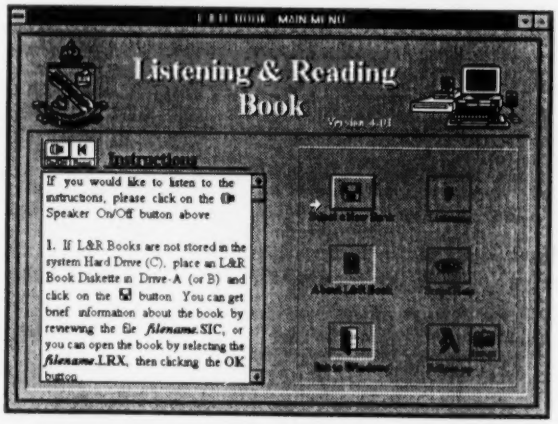
Listening & Reading Book
Instructions
If you would like to listen to the instructions, please click on the Speaker On/Off button above
1. If L&R Books are not stored in the system Hard Drive (C), place an L&R Book Diskette in Drive-A (or B) and click on the button. You can get brief information about the book by reviewing the file filename.SIC, or you can open the book by selecting the filename.LRX, then clicking the OK button.

Figure 1. The L & R Book (Main Menu)

Teaching/Learning Methodology

- Each book begins with a "background information" or schema section that puts the listening/reading text into context for students. This part can provide information on content, language, and culture, enhanced by illustrations important for text comprehension, or the student can be (t)asked to recall previous knowledge about a given topic.
- The second stage builds a segue from background information to text processing by having the students build expectations based on scripts (background knowledge). A variety of activities is possible here as pre-listening activities: predict story lines based on titles or keywords, pictures; predict types of information; predict linguistic features; etc. The predictions are then compared with the actual listening/reading passage. Another possibility of top-down processing that is supported by the template is the global task of determining what the topic of a given selection could be, whether a text seems to be supportive or not of a given opinion, etc. The student should be able to perform this task based mostly on background knowledge rather than on incoming information from the text itself.
- The template then proceeds to bottom-up processing where the student needs to shift focus to the features of the incoming text itself. For

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example, students could read/listen to all the notions that pertain to "pro" or "con," all the linguistic features that give indication of a sequence of events, who the agents of certain actions are, different information that is given about the people in a story; the list is endless. The teacher can create many different bottom-up activities to lead students to the degree of text comprehension that is desired. Each of these activities can be accompanied by a sound-clip and image. Students write their responses on the notepad and then compare their answers to those provided by the teacher.

- Follow-up activities comprise the skill-integration portion of the program. These activities are to be done outside the computer environs, generally in the classroom. Students are assigned a choice of related tasks for small-group or individual activities which may lead to a speaking, reading, or writing task around the topic of the **L & R Book**'s content, or any combination thereof.
- If the students would like to work on translation, transcription, or pronunciation, there are also separate screens for those functions. The translation of the script may be provided as feedback by developers.

Development of Supportive/Enabling Skills

Area studies and culture of the target language, including history, geography, politics, economy, military, and social issues related to the content of the **L & R Book** can be provided as student help, either in the target language or in English. Students can get access to help files from any screen.

Vocabulary Help

Vocabulary help is provided on the main script as "hot words" and is made available via the help menu. When the user clicks on a selected "hot word", which is marked with a frame around it, a small window containing data related to this item opens below the selected hotword. The scrollable field of this window enables developers to use this device innovatively for other purposes besides the vocabulary explanation.

ANALYTIC FEEDBACK

- On-screen feedback is provided for each task assigned. Students are guided to work on the assignments, check their responses against feedback, and then proceed to the next task.
- If students wish to have their work reviewed by their teacher for further feedback, they may exercise an option to save all their work on a floppy disk before ending their session with the **L & R Book** Viewer Template.
- The **L & R Book** Template system monitors students' study on each book and reports the survey results on the same floppy disk or on hard copy printout for analysis by the teacher.

User-Friendliness

Standard buttons as operational devices, dialogues in plain language, task-sensitive navigational guidance, functional help utility, and unrestricting suggestions for a preferred work path are utilized to provide a pleasant environment in the adult foreign language teaching/learning process.

TEACHER'S DEVELOPER TEMPLATE (TEACHER'S BOOK)

The Teacher's Book is organized in six Module Books. At the opening screen, those books are displayed on a "Bookshelf" (Figure 2). The Bookshelf is the Main Menu for the Teacher's Book, permitting access to any of the module books. Teachers can return to the bookshelf from any module to switch to another module book out of sequence. Teachers can also access a Tutor Book via the bookshelf. In the Tutor Book, the organizational charts of both the Teacher's Book and the **L & R Book** are displayed; by clicking on any organization box, users can get detailed information about the functions of each module in the Teacher's Book.

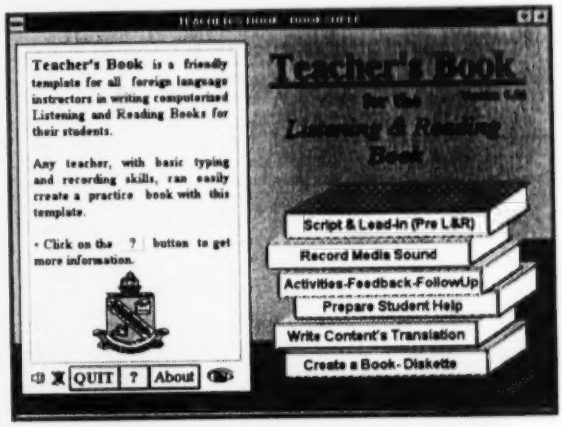
Teacher's Book is a friendly template for all foreign language instructors in writing computerized Listening and Reading Books for their students.
Any teacher, with basic typing and recording skills, can easily create a practice book with this template.
• Click on the ? button to get more information.
QUIT
?
About
Teacher's Book
Script & Lead-In (Pre L&R)
Record Media Sound
Activities-Feedback-FollowUp
Prepare Student Help
Write Content's Translation
Create a Book-Diskette

Figure 2. The Teacher's Book (Bookshelf)

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Script and Lead-in

In this module teachers select the book language, type in the main script, provide schema-building background information, and assign the pre-listening/reading task and feedback. The book/main script appears on each module book's work screen as a reference for the developer.

Record Media Sound

In this module, teachers record the main sound file via either line or microphone connection. The length of the sound file cannot exceed 90 seconds. By using the Sound Editor, teachers can also create a sound clip per activity from the main sound file.

Activities - Feedback - Follow-up

In this module, teachers write up to nine (9) "bottom-up" activities. Bottom-up is the detailed, text-specific work. Teachers provide feedback for each activity, and they may enhance each activity with an image or illustration. Activities and feedback can be written in either language. When teachers have finished the activities, they may go onto the next step and write the "follow-up" tasks to provide skill integration on a similar topic, outside the computer environs.

Prepare Student Help

In this module, teachers provide extra material for enabling/supporting skills, by simply writing explanations about the issues mentioned in the book script. Help categories include: Culture, Economy, Geography, Grammar, History, Military, Politics, Social Issues, Vocabulary, and Various Others. Vocabulary help is prepared on a sub-module. Although the help function is called "Vocabulary," it can be used creatively for different purposes rather than just as a vocabulary help.

Write Content's Translation

Teachers may provide the translation of the script as feedback for the students' study/work.

Create a Book-Diskette

The last step of the development process is making a L & R Book-Diskette. In this module, teachers can also provide input for the Book's Summary Information Card, and they can transfer the L & R Book to the System Storage upon completion and/or add it to the L & R Book Disk Library for their students.

PRESENTERS' BIODATA

Jon V. Varosh is an Assessment Applications Specialist at the Defense Language Institute Foreign Language Center. His responsibilities include designing and developing application programs to integrate computers into foreign language instruction, program evaluation, research, and testing. He has 14 years of experience in adult foreign language education.

John A. Lett, Jr. is Director of Research and Analysis at the Defense Language Institute Foreign Language Center, where his responsibilities include conducting and coordinating research performed at or for DLIFLC, including cooperative research projects. Dr. Lett is also the head of the Office of Research and Technology Applications under the Technology Transfer Act. He holds a Ph.D. in Foreign Language Education from The Ohio State University.

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A TRIP TO POLAND

WALDEMAR WALCZYNSKI

ABSTRACT

A Trip to Poland is designed as listening comprehension courseware for the Polish language for students at the intermediate level. The courseware is designed for the Macintosh computer working under Apple System 7.0 and above.

The present paper concentrates on a description of the following.

- Overall structure of the courseware.
- Use of graphics and scanned photographs.
- Use of text fields and color within text fields.
- Menus and buttons and their role in helping the user better interact with the computer.

GENERAL DESCRIPTION OF THE COURSEWARE

A Trip to Poland has been devised for practicing listening comprehension for English-speaking students of Polish at an intermediate level. It consists of two scenarios (reasons for visit). (See Figure 1.)

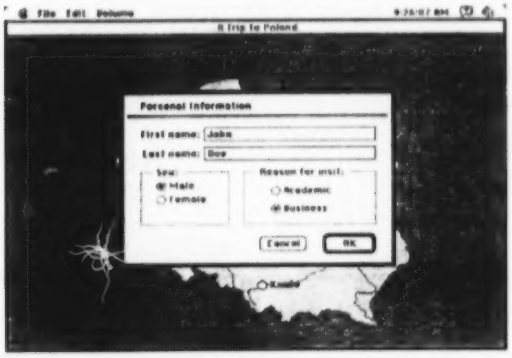

Figure 1.

The users can choose the scenario they are interested in at the beginning of the practice. Since all the users "land" in Warsaw, they are advised to begin their trip there. (There are two different situations for each copy of Warsaw corresponding to the two scenarios.) After that, the users can choose any of the four remaining cities in each scenario by clicking on any of their names on the map of Poland. The names of the cities belonging to the other scenario are inactive (dimmed). The users can choose the city they want to go to on the basis of information contained in the Language sub-menu in the Help menu, where they find information about the topic of the conversation they are to conduct in a given city, the kind of information they are supposed to obtain from their interlocutor(s), and what kinds of categories of communication functions are covered in the dialogue (Figure 2).

Figure 2.

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DESIGN OF THE COURSEWARE

The courseware consists of the following parts.

- **A Trip to Poland**, a stand-alone application.
- Help, accessible both at the beginning of the practice and at any time during the practice from the Apple menu or the Help button.
- Ten modules (five in each scenario) and supporting projects (equivalents of **HyperCard** stacks). (See Figure 3.)

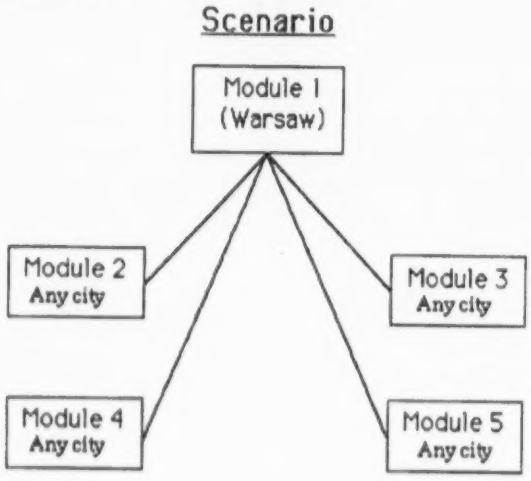


Figure 3.

Each module in turn consists of the following parts.

- **Introduction to a city**. Here the users can hear and read about the city they are in. They can look at some of the most interesting, famous, or important places in a given city.
- **Finding the way**. The users are given directions to the place where they can find their interlocutors. The users can find their interlocutors by following the directions and manipulating a figure on the map.
- **First listening**. In this part, the users are introduced to the topic of the dialogue. They are given basic information concerning the topic, and they can check their understanding of the vocabulary related to the topic.
- **Dialogue**. This part consists of prerecorded statements that users are expected to elicit from their interlocutor by choosing one of the three possible reactions. Each choice leads to a different response, thus allowing the users to build a variety of different dialogues with the same interlocutor.
- **Notes**. The users have a chance to listen to the dialogue they created and make notes by selecting (multiple choice) topics and topic details. Their choices are saved and stored in the form of an electronic document.

Graphically this can be shown as follows.

(See Figure 4.)

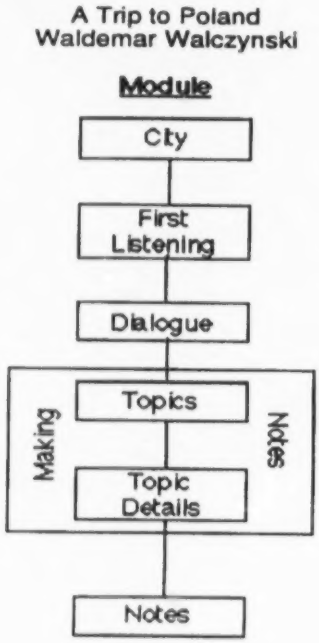


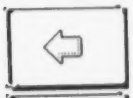
Figure 4.

DESCRIPTION OF THE BUTTONS AND MENUS

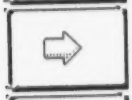
Each screen in the supporting projects has the following: navigational buttons, audio buttons, transcript buttons, a Help button, and the score window.

Help consists of three parts: introduction, system requirements, and language. The introductory part gives the users all the necessary information about navigating the courseware: its parts, the use of the buttons, and what is required of them to successfully complete each module.

The system requirements give the user the configuration necessary to run the courseware and a description of the menus and buttons (Figures 5-11).



THE PREVIOUS BUTTON. The previous button allows the user to return to the preceeding page in the same unit.

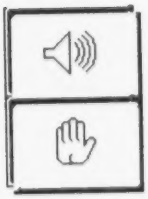


THE NEXT BUTTON. The next button allows the user to proceed directly to the following page in the same unit.

THE RETURN BUTTON. The return button permits the users to look back at what they have done so far and then return to the exact spot they left off.

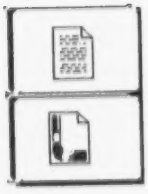
THE MAP BUTTON. The map button brings the users back to the main map where they can access cities and thus, units they have covered so far.

Figure 5.



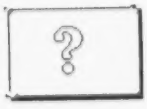
THE AUDIO BUTTONS. With these two buttons the user can activate or deactivate the audible portion of the unit.

Figure 6.



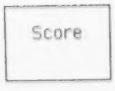
THE TRANSCRIPT BUTTONS. These two buttons show and hide the transcript of the current audio portion. The brush button wipes transcripts out.

Figure 7.



THE HELP BUTTON. This button allows the users to go to the Help file.

Figure 8.



THE SCORE. This window, located in the upper right-hand corner, shows how many points the user has scored. It is not a button as such, though it looks like one.

Figure 9.

Apple Menu

About A Trip to Poland...

Brings up the dialogue box with credits, copyright notice and available memory.

Help

The command will assist the user in gaining information about the courseware.

Figure 10.

Volume Menu

The user can adjust the volume of the sound here without going to the Control Panel folder.

Figure 11.

DESCRIPTION OF THE SCREENS

The screens in the City part consist of the following layers. The first layer of a screen is a photo of a characteristic place, building, or a part of the city. (See Figure 12.)

It is accompanied by text in an audio form describing the object in the photo or the area of the city where it is located. Beneath is a set of buttons that check comprehension (see Figure 13).

Still beneath this layer is the transcript of the audio part, which is accessible at any moment and as many times as desirable.

Some words and phrases in the transcript (marked in red for words and marked in red and underlined for phrases) are linked to pop-up windows that give the word or phrase in the form it is used in the text, its basic Polish form, and its English equivalent, as well as an English translation of the sentence or the part of it where the word or phrase appears (see Figure 14).

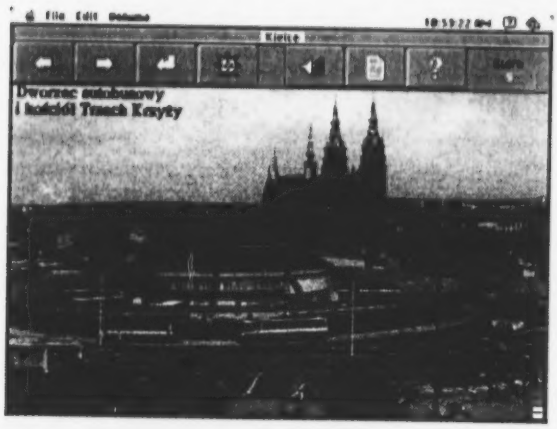


Figure 12.

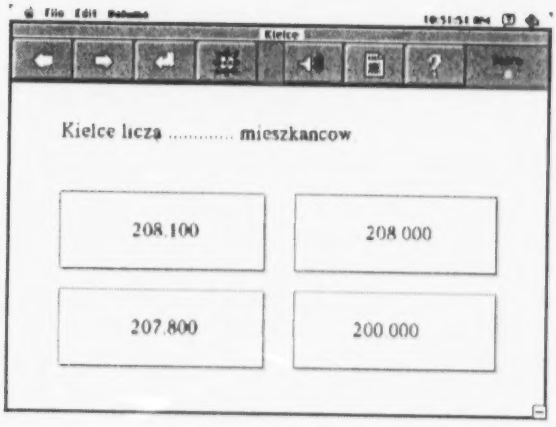


Figure 13.

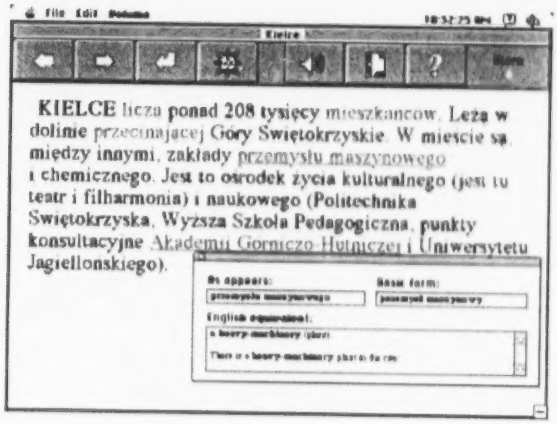

KIELCE licza ponad 208 tysięcy mieszkancow. Leża w dolinie przecinajacej Góry Swiętokrzyskie. W miescie są między innymi, zakłady przemysłu maszynowego i chemicznego. Jest to osrodek życia kulturalnego (jest tu teatr i filharmonia) i naukowego (Politechnika Swiętokrzyska, Wyższa Szkoła Pedagogiczna, punkty konsultacyjne Akademii Gorniczo-Hutniczej i Uniwersytetu Jagiellonskiego).

Figure 14.

Find the Way consists of the following layers:

- The map of the city in which the users are at the moment. The screen is accompanied by the directions to the place where the users can find their interlocutor (Figure 15).
- A detailed map of the part of the city where the interlocutor can be found. On this map is a figure that can be moved in four directions using the arrow keys (Figure 16).
- The transcript of the audio directions.

Figure 15.

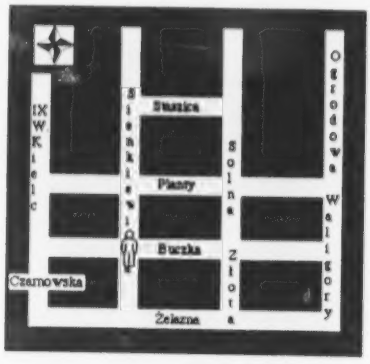


Figure 16.

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First Listening consists of the following layers:

- A graphic representation of the text introducing the topic of the conversation to the user. Again, it is accompanied by an audio portion (Figure 17).
- Beneath the graphic representation is the transcript of the audio part with selected words and phrases, their basic forms, English equivalents, and translation of the sentences or their parts that a given word or phrase appears in.

Figure 17.

Dialogue is a mixture of screens similar to the ones that are used in the First Listening part and include photos of the interlocutor, seen below in Figure 18.

Figure 18.

We decided on this format for the following reasons:

- The dialogues are not dynamic enough (there are no arguments, fights, disappointments, etc. in them) to have screens consisting only of the photos of the interlocutors. Filling the courseware with the photos of interlocutors in static positions would be rather boring, and therefore we decided to intertwine them with graphics.
- We did not think we could make a video which would allow the interaction we desired. In addition, cost was a factor. There were no educational videos in Polish available for us to use. We felt that making a good video in the United States with Polish native speakers would be too expensive, and we were not sure of its realism. Finally, making a video in Poland would have been even more expensive.

Notice that the Move Forward button is disabled in this part of the courseware. The users can move forward only by reacting to what their interlocutor says; i.e., by selecting one of the three buttons that appear after the audio part is over or has been stopped.

After the dialogue has been built, it is automatically replayed. The replay does not stop after each question the student asked. Afterall, the student might have asked questions not related to the reason of his or her visit to Poland. The replay only stops when the passage covering a topic vital to the student's task has been covered and the next one is about to start. The student is then asked to select the button, from those presented on the screen, that summarizes a given topic (Figure 19).

Figure 19.

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When the student selects the wrong button, he or she is told the choice was wrong. The passage to the next task can only occur when the user has selected the correct topic (Figure 20).

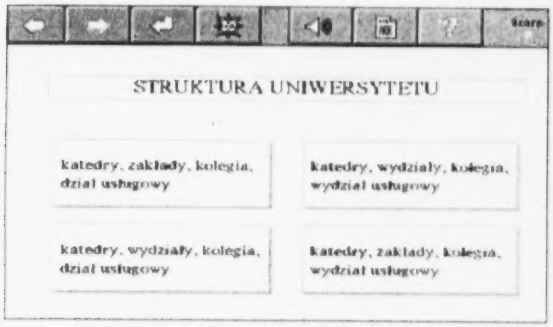
STRUKTURA UNIWERSYTETU
katedry, zakłady, kolegia, dział usługowy
katedry, wydziały, kolegia, wydział usługowy
katedry, wydziały, kolegia, dział usługowy
katedry, zakłady, kolegia, wydział usługowy

Figure 20.

The user's next task is to select the details that are covered in a given topic. The topics and their details in a given scenario constitute a student's notebook (Figure 21).

Figure 21.

Students' documents can be visible on the desktop:.

Figure 22.

STUDENTS' DOCUMENTS

The documents saved by the students can be accessed by teachers in situations when they cannot supervise students' practice. The documents can be opened by any word-processing application. Apart from biographical data, of course, the teacher can see how many points the student scored (57), in which scenario (academic), and which project was covered (Kielce), how many times (1), and what notes were made (Figure 23).

```
John, Doe
Male
57
Academic
0,3,0,0,0
project "Kielce",window "Kielce",card
"Notes"
10
10
190,229
5
Kielce,4
Struktura, katedry; wydzialy; kolegia;
dizialuslugowy Wydzialy, lit.&sztuki;
prawa&ekonomiki; medycyny&przyrody
Kolegia, jeykowe; rolnicze Dziatobstugi,
rektora; radamecenasów; administr:;
biblioteka; drukarnia
```

Figure 23.

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TECHNICAL DESCRIPTION

The courseware has been developed in **SuperCard**. The audio part has been edited with the use of **SoundEdit Pro** and **ResEdit**. The photographs have been scanned on a MicroTech scanner and edited with the use of **Photoshop**.

CONCLUSION

The design I have just described is the result of a conscious decision to provide the user with a variety of choices and at the same time to make the courseware useful for a variety of users with various needs. Therefore, we do not expect each student to use all the available features. We know that students rarely do. On the other hand, we did not want to leave the user without a feature he or she might want. We believe that we have managed to achieve this aim while at the same time keeping the screen transparent and the whole courseware easy to use.

ACKNOWLEDGMENT

The author wishes to express his gratitude to the following persons for their help and valuable suggestions: Prof. D.Ashworth, Prof. N. Garrett, Ms. A. Grognet, Prof. M. J. Mikos, and Prof. I. Thompson.

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Pushing All the Right Buttons: The Design of a Multimedia Bulletin Board

Lloyd Wiebe

ABSTRACT

The recent advent of computer conferencing has presented language teachers with an alternative teaching technique that has high promise for language learning. Computer conferencing provides the student with an audience of peers for writing and lots of peer writing to read. In addition, computer conferencing individualizes the communication effort while still having the student work and communicate with peer groups.

This presentation focuses on the design of a particular type of computer conferencing system called a bulletin board. The bulletin board system that will be demonstrated provides more information to the language learner and allows for more communication variation than most conferencing systems. It makes use of current multimedia technology to show students textual, voice, pictorial, and video information about events occurring at the school. Students can also post their own textual, voice, or pictorial event messages on the general bulletin board system.

Once students enter the bulletin board system they can post text messages, voice messages, or video messages to any bulletin board group they are a member of. Students can also read, listen to, or watch all the messages previously posted on the bulletin board by their peers.

This type of multimedia bulletin board system incorporates the most recent multimedia technology and interface design techniques available to create a user interface that is both enjoyable and intuitive. Icons or pictures are extensively used throughout the system rather than labeled buttons to provide a clearer guide through the system. Information is presented to the student in a variety of ways including sound, pictures, and video. Short video clips of student bulletin board participants are displayed whenever a student wants to see who posted a message.

The bulletin board software was designed and implemented by Lloyd Wiebe in a language called Visual Basic for Windows and runs on a PC-type of computer using **MS-Windows** 3.1. It is set up to work in English, but could very easily be adapted to work with most languages with a Roman-based alphabet; **MS-Windows** supports 15 such languages.

The demonstration will show the software and real-life examples of student bulletin board communications including digitized videos of students.

PRESENTER'S BIODATA

Lloyd Wiebe is a Ph.D. candidate in the Second Language Acquisition and Teaching Department at the University of Arizona in Tucson, where he is majoring in L2 Pedagogical Theory (with emphasis on CALL materials development and research) and minoring in L2 Learning Processes. He has an M.S. in computer science (University of Arizona, 1981) and an M.A. in English as a Second Language (University of Arizona, 1990). He has worked for more than 15 years as a professional programmer for companies such as IBM and Rockwell. In addition, he has spent eight years teaching and studying in Costa Rica, France, Zaire, Thailand, and Taiwan. Lloyd currently teaches ESL classes at the Center for English as a Second Language at the University of Arizona.

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A Neural Network for Disambiguating Pinyin Chinese Input

Mei Yuan, Richard A. Kunst, and Frank L. Borchardt

INTRODUCTION

The most user-friendly way of typing Chinese on a personal computer is through entering it phonetically, as one would speak, by typing in a standard Roman transcription such as *pinyin*, and letting the computer do the work of looking up the *pinyin* words in an internal dictionary which contains correspondences between *pinyin* and Chinese Hanzi characters, then converting them instantly into the correct characters. This phonetic conversion method is the main Chinese input method for both courseware authors and students in the **WinCALIS** 2.0 Computer Assisted Language Learning (CALL) authoring system for Windows. But there is an inconvenience to the *pinyin*-based typing of Chinese because there are many homophones, words which sound alike, even when tones are taken into account. In such cases, the computer can only present the typist with a selection list and ask him to choose the desired word. (If Chinese were English, the typist would enter the phonetic transcription "tu," and be presented with the homophone selection list "to," "two," and "too.")

Sometimes the typist must search and choose from among dozens of Chinese characters. Homophones are most numerous for the single-syllable words which form the high-frequency core vocabulary of any language. Choosing from among a list of homophones is obviously inefficient. Some efforts have been made to deal with this problem, such as maintaining frequency lists and typing in longer contexts of combinations of syllables. These are made use of extensively also in **WinCALIS** 2.0. Here we would like to introduce a new approach to deal with cases where these other approaches fail: a neural network which is used to predict the most likely word.

Perhaps because our software is used to assist in language teaching, it is easy to imagine that syntax could help to predict. But the problem is that natural language is so flexible that it can't be defined clearly like a computer language. The concept of the neural network has been talked about for several years and has been explained in various ways. Here, we would like to explain a neural network by drawing an analogy. There are two ways to learn language: one is native language learning, the other is foreign language learning. The difference between these is just like that between the neural network and the traditional computer. Foreign language learning, by which we mean learning at school, starts with character, pronunciation, sentence structure, and so on. That means the teacher knows all the details, and teaches what to do and how to do it. This is like the traditional computer algorithm — it does what people know definitely how to do and what will happen. But the neural network is designed to simulate the intelligence of human beings and to tell us how to do something after it learns by itself. It is similar to native language learning. Parents hardly are concerned at all about syntax, but the child will speak perfectly after listening and listening. Parents never talk about any rules of language, but the child will follow these rules even though he never notices them. Similarly we provide to the neural network only samples of Chinese text, but no rules, and after learning by itself, it will know what to do. It will know which homophone is the right one to fit in a certain context, just as the English speaker knows which form of /tu/ fits in a certain context. Thus a neural network looks as if it is very suitable to deal with the problem of Chinese input.

STRUCTURE

The structure of the neural network in **WinCALIS** is shown as Figure 1.

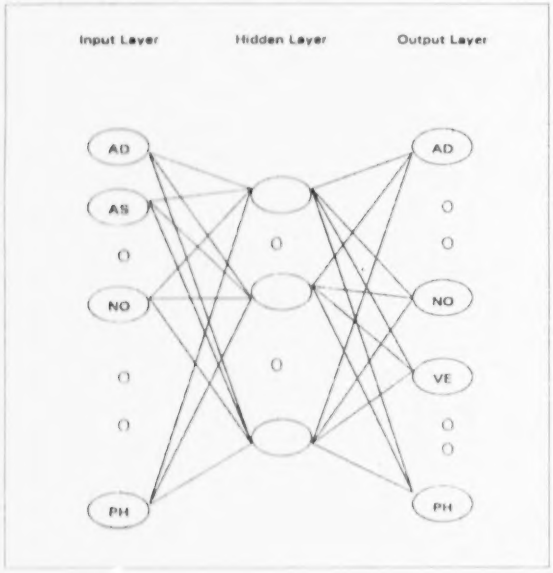

Figure 1. Structure of the Neural Network

There are 23 nodes both in the input layer and the output layer. Each of the nodes stands for one word class category, like "noun," "verb," "adverb," etc. There are 7 nodes in the hidden layer. The input is one certain word class, and the output indicates the different probabilities of any of the 23 word classes appearing after that word class.

TRAINING

To train the neural network is to find an appropriate weight matrix according to the training material. We used the generalized delta rule as the learning algorithm for the network. The training material consists of many sample sentences. While the typists who compiled the training material typed Chinese, a file including all the information about word classes was automatically created. For example, when the following sentence was typed:

Wǒ yǒu sān bǎ yàoshi.
我有三把钥匙。

I have three (measure for keys) keys.

the corresponding wordclass string "PR Vt NU ME NO EP" (which stands for pronoun, verb-transitive, number, measure, noun, and period) was also saved.

When the neural network was trained, any two adjacent word classes were used as a pair of Input and Target. Thus in the sentence above, the pairs of Inputs and Targets are (PR Vt) (Vt NU) (NU ME) (ME NO) (NO EP). When the neural network gets a word class input, it converts the word class to a vector I = (i1,i2,i3 ... i23) by giving a high value to the node corresponding to that word class, and giving a low value to all the others. So if the input word class is AD (adverb), the input vector is I = (0.999, 0.001, 0.001 ... 0.001). The target is converted in the same way.

After it gets its input, the neural network calculates step by step from the input layer to the output layer.

$H = W^h.I$;
$O = W^o.H$; (Here, H is Hidden, I is Input, O is Output)

Because the output will be the probability, the value of which ranges from 0 to 1, we used the sigmoid function $f(x) = 1/(1+e-x)$.

h1
h2
. = H = f(Wh.I)
. hk:=
h7

o1
o2
. = O = f(Wo.H)
.
o23

Then it compare the output with the target and gets the errors. Using these errors it back-propagates step by step from the output layer back to the input layer, in order to adjust the weight matrixes.

1
2
. = = (T -O).f'(O)
.
23

$f'(x) = (1/(1+e-x))' = f(x).(1-f(x))$

h1
h2
. = h= .Wo.f'(H)

h7
W(t+1)= W(t) + . .(I)T+ . W(t-1)

After completing those steps for a single Input-Target pair, the next Input-Target pair is used to repeat the above steps, then the next, then the next until the whole material is learned (about 60,000 word class tokens for the whole material).

We did not use masses of training material, so the neural network had to occasionally re-learn the same material. When the table resulting from a trial run had only a few changes after one more training, we considered that the weight matrixes had converged sufficiently. Below is the table of weight matrices which **WinCALIS** uses now.

Adverb	AD (VE 0.6700 VA 0.0826 CV 0.0769 AD 0.0713)
Adstative	AS (AJ 0.9750 VE 0.1478 NO 0.0594)
Adjective	AJ (NO 0.3135 VE 0.1979 PS 0.1131 EC 0.0885 EP 0.0802)
Coverb (Prep.)	CV (NO 0.5748 VE 0.1640)
Interjection	IN (NO 0.4567 VE 0.1553 AJ 0.0780)
Movable. Adv.	MA (NO 0.5776 VE 0.2537 AJ 0.0594)
Measure	ME (NO 0.4664 VE 0.1407 AJ0.0801)
Noun	NO (NO 0.3253 VE 0.1812 EC 0.0741 EP 0.0686 PS 0.0592 AD 0.0569)
Number	NU (ME 0.5017 NU 0.3380 VE 0.1672 NO 0.0751)
Particle	PA (EP 0.3095 NO 0.1819 NU 0.1483 EC 0.1085 VE 0.0513)
Ordinaliz. Part.	PO (NU 0.8621 VE 0.1375)
Subord. Particle	PS (NO 0.6858 AJ 0.0894)
Prevrb.Sub.Part.	PT (VE 0.5069 AJ 0.2129 NO 0.1655 CV 0.1092 AD 0.0529 PS 0.0504)
Pstvrb.Sub.Part.	PU (AJ 0.5234 VE 0.1836 NO 0.1256 AD 0.1092)
Specifier	SP (ME 0.6236 NU 0.1553 NO 0.0875)
Stative Verb	SV (NO 0.2955 VE 0.1879)
Aux. Verb	VA (VE 0.6698 AJ 0.1123 CV 0.0839 AD 0.0517)
Verb	VE (NO 0.3315 VE 0.1636 NU 0.0706 EC 0.0624)
Verb-Complmnt.	VC (VE 0.2961 NO 0.1656)
Verb-Obj.Cmpd.	VO (VE 0.2391)
Period	EP (NO 0.6524 VE 0.1531 AD 0.0588 MA 0.0563)
Comma	EC (VE 0.2786 NO 0.2205 AD 0.1555 AJ 0.0731 MA 0.0559)
Phrase	PH (VE 0.4510 AD 0.0750 NO 0.0581)

Figure 2. Table of Neural Network Prediction Weights

This table indicates the probability of one word class being followed by another. For example:

- after AD (adverb), VE (verb) is the most probable word class, occurring 67% of the time;
- the second most probable one is VA (auxiliary verb), occurring 8% of the time;
- CV (coverb, similar to the English preposition), and AD (adverb), are the next, each occurring 7% of the time;
- and the other 19 word classes have such a low probability that they are neglected.

OPERATION

The neural network will function when the typist presses the space bar, which serves as a convert key after he finishes typing a word in *pinyin* transcription and any homophones are found after a search of the **WinCALIS** internal dictionary of *pinyin*-Chinese character correspondences. It gets the word class of the preceding already converted word from the text buffer, does its calculations, and gets the list of probable following word classes. Then the word classes of the homophones are compared with this list. If only one word has the word class belonging to the list, it is considered as the one the typist wanted as in automatically converted without any user intervention. For example, in the sentence cited above,

Wǒ yǒu sān bǎ yàoshi.
我有三把钥匙。

I have three (measure for keys) keys.

in the **WinCALIS** internal Chinese dictionary, *yàoshi* has the entries:

要是	"if"	MA (movable adverb)
钥匙	"key"	NO (noun).

Bǎ is a measure which may be followed by NO (noun), VE (verb), AJ (adjective), but not MA (movable adverb), so the neural network predicts it is the *yàoshi* meaning "key" 钥匙.

If more than one match is found, the most probable word will be compared with the second probable but different word. If the difference of probability is significant, the neural network will be sure that the most probable word is the one the typist wants.

Consider the word *jin* in the following example:

hěn jìn

很 jìn

very ?

In the dictionary, the syllable *jin* has the word entries:

进	"come in"	VE
近	"near"	AJ
劲	"energy"	NO

Hěn is AS (adstative), so AJ gets the probability of 0.975, but VE and NO only get 0.1478 and 0.0594, respectively. The difference is very high, so the neural network is sure it is the *jin* meaning "near" 近.

But in another example,

qī qī

七 qī

seven ?

in the **WinCALIS** internal dictionary, qī has the word entries:

七	"seven"	NU
期	"period"	ME

qī 七 is a NU (number), so it may be followed by both another NU (number) and ME (measure), and the difference of probability between NU and ME (which is 0.5017 - 0.3380 = 0.1637) is considered as insignificant. The neural network will not predict in this situation. In fact, both qī qī *(nián)* 七七年 "(the year) seventy-seven" and *(dì)* qī qī 第七期 "seven(th) period" are possible.

ENHANCEMENTS

When we analyzed the neural network's training and operation, it also suggested to us to regroup the word classes. We originally had combined all the verbs — Vi (verb-intransitive), Vt (verb-transitive), Va (verb-auxiliary), and Vr (verb-resultative) in one category VE. Because the word class NO (noun) was more likely to follow this mega-word class VE (verb) than any others, when one typed an auxiliary verb+main verb phrase like *néng tīng* "can listen," the neural network always favored the noun for the second word, choosing the nonsensical 能厅 "can hall," instead of the desired 能听 "can listen." We thought about the difference between Va (auxiliary verbs) and regular verbs and decided to separate the Va from the VE category. It is wonderful that the neural network confirms that the lists of probable words after regular VE and Va are totally different. This is true also for the newly created word class AS (adstative) from the more general word class AD (adverb), and PT (preverbal subordinating particle de 地) and PU (postverbal subordinating particle de 得), differentiated from PS (subordinating particle de 的).

CONCLUSIONS

The network usually selects correctly by providing the output with highest probability in that context: the likelihood that it will offer a correct choice in second or third place, if first place is in error, approaches 100%. Considering that the system allows for twenty other outputs, this result is highly significant. The network has "learned" the allowable and unallowable sequences in Chinese syntax and applies that "learning" to the actual task of typing Chinese in phonetic representation.

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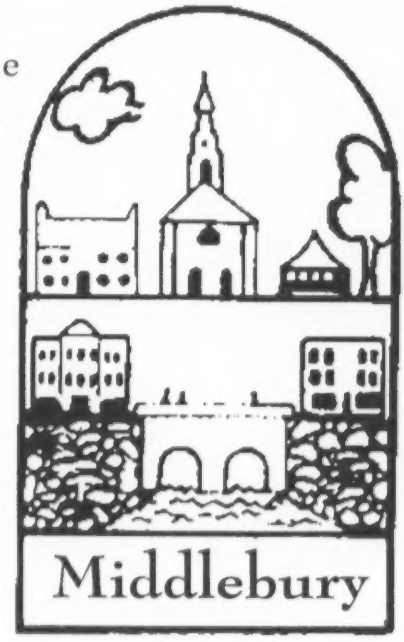

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